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Explanatory Factors for Benefits and Reasons for Undertaking Professional Development Activities by Senior Secondary School Agriculture Teachers in Swaziland

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Abstract

A descriptive correlational research was designed to identify factors explaining benefits and reasons for undertaking professional development activities by senior secondary school agriculture teachers. Desk review and a modified Delphi technique were used to generate items used in a survey questionnaire for data collection. From the target population (N=134), a representative sample of agriculture teachers (n=103) was drawn for the study. Findings revealed that senior secondary school agriculture teachers benefitted from undertaking professional development activities. Variables that explained benefits and reasons for undertaking professional development activities were personal reasons, curriculum related changes, societal related changes and school location. The conclusions drawn from the findings of the study were that, for senior secondary school agriculture teachers, the most important motivating factor for undertaking professional development activities was competence related reasons and they benefitted intrinsically from undertaking professional development activities. Teachers who undertake professional development activities should be given accelerated promotion and access to qualification upgrading opportunities.

Key words: Professional development, senior secondary school agriculture teacher, benefits of professional development, competence.

Introduction

Professional development is defined as efforts to improve teachers' capacity to function as effective professionals by having them learn new knowledge, attitudes and skills (Broad and Evans, 2006). Agriculture is the mainstay of the economic growth and development of many countries, therefore a need is apparent to develop the agriculture professionals with the necessary skills and knowledge in agriculture.

Theoretical/Conceptual Framework

There are a number of factors that influence the reasons for undertaking professional development activities. The factors include personal reasons (Anangisye, undated), competence (Nzuza, 1989), educational policy (Anangisye, undated), curriculum changes (Schieb and Karabenick, 2011), financial factors (Chiadiaka and Awili, undated), global competitiveness (Brown et al., 2008), peers, family and significant others (Salzer, 2002), technological advancements (Ozioko and Mwabueze, 2011), societal changes (Moeini, 2008) and, background and demographic variables (Lagfield and Dobbins, 2003).
The specific objectives of the study were to:

1. Describe the benefits derived by senior secondary school agriculture teachers from undertaking professional development activities.
2. Describe reasons for undertaking professional development activities by senior secondary school agriculture teachers in terms of personal, curriculum changes, educational policy, global competitiveness, societal changes, financial, technological advancements, family, peers and significant others and, competence related reasons.

Methodology

The design of the study was descriptive correlational. A triangulation of desk review, a modified Delphi technique and a survey questionnaire were used for data collection. Descriptive correlational design is a design that seeks to establish the relationships amongst the variables. A desk review research is collecting data from existing resources (Management Study Guide, 2013). Delphi technique is used for achieving conver-

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gence of experts' opinion experts within a certain topic area. Finally, a survey questionnaire is a data collecting tool whereby respondents are required to fill closed or open ended questions in a survey (Jurs, 2005).

The outcomes of the desk review and the modified Delphi technique were used to develop the survey instrument, which determined the reasons for undertaking professional development activities by senior secondary school agriculture teachers in Swaziland.

The target population for the study was all senior secondary school agriculture teachers in Swaziland (N=134) from which a sample (n=103) was drawn. Frame error was controlled by obtaining an up to date list from the agriculture senior inspector's office. The list was purged to avoid duplication of names, thus controlling selection error. The instrument was validated through the Delphi process. *Post hoc* reliability coefficients were found to range between 0.83 and 0.95 for the questionnaire domains.

A questionnaire was used to collect data, following guidelines by Dillman (1978). The questionnaire was divided into four parts. Part I assessed the dependent variable - benefits and reasons for undertaking professional development activities. Respondents were asked to indicate their level of agreement on identified benefits and reasons for undertaking professional development activities. The following rating scale was used in rating the questionnaire items: 1= strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, 6 = strongly agree.

Part II contained the items relating to the major independent variable, personal reasons. The respondents were asked to indicate their perceived level of agreement on how personal factors influence their undertaking professional development activities. The following rating scale was used in rating the items: 1= strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, 6 = strongly agree.

Part III consisted of rival independent variables, curriculum changes, educational policy, global competitiveness, societal changes, financial reasons, technological advancements, family, peers and significant others and competence. The respondents were asked to indicate their level of agreement regarding with the rival independent variables. The following rating scale was used: 1= strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, 6 = strongly agree. Part IV consisted of the background and demographic variables and respondents were asked to circle their choice or fill the requested information.

Self-administered questionnaires were used to collect data and the questionnaires were hand delivered to sample senior secondary school agriculture teachers in their respective schools. Teachers were given a week to fill the questionnaires. Regarding the senior secondary school agriculture teachers, the non- response error was not a threat to external validity, since all questionnaires were answered, returned and usable.

The Statistical Package for Social Sciences (SPSS) version 20 for windows was used to compute data. The data were analyzed using descriptive statistics, t-test, ANOVA, correlations and stepwise multiple regression as guided by the objectives. An *a priori* probability level of 0.05 was established to determine the level of statistical significance.

Findings

Results were summarized in terms of the following: benefits and reasons for undertaking professional development activities, reasons for undertaking professional development activities, background and demographic variables of respondents, relationship among dependent and independent variables and, predictors for benefits and reasons for undertaking professional development.

Benefits and Reasons for Undertaking Professional Development Activities

Table 1 indicates that the senior secondary school agriculture teachers agreed that they derived benefits from undertaking professional development activities (M=4.66, SD=1.14).

Table 1. Benefits and reasons for undertaking professional development activities by senior secondary school agriculture teachers in Swaziland (N=103)

Item	M	SD
Teach effectively	5.25	1.05
Keep useful records	4.69	1.17
Progress in my career	5.20	1.02
Improve my work performance on the job	5.32	1.00
Acquire more knowledge	5.25	1.02
Build my current behaviors	4.39	1.15
Build my competences	5.08	.91
Enhance my behavior	4.37	1.17
Enhance my competence	5.06	.93
Enhance my Skills	5.14	.89
Prepare my lesson plans competently	4.39	1.32
Prepare my students for external examinations	4.62	1.19
Prepare my students for internal examinations	4.42	1.21
Conduct in-service training for other teachers	3.96	1.36
Work with the community	3.94	1.36
Understand the community	4.01	1.25
Understand more about the environment in which i work	4.59	1.06
Plan	4.16	1.21
Reflect	4.50	1.08
Have a positive working relationship with my co-workers	4.70	1.27
Understand research	4.80	1.17
Consume research	4.37	1.43
Do independent reading	4.55	1.35
Assist a colleague	4.52	1.22
Assist students improve their learning	5.06	1.03
Assist other teachers to become effective	4.61	1.09
Plan for success	4.93	1.03
Overall	4.66	1.14

Rating Scale: 1 = strongly disagree; 2 = disagree; 3 = slightly disagree; 4 = slightly agree; 5 = agree; 6 = strongly agree

Reasons for Undertaking Professional Development Activities

Table 2 provides the level of agreement with the benefits and reasons for undertaking professional development activities using means and standard deviations. Senior secondary school agriculture teachers were in agreement with the benefits and reasons for undertaking professional development activities.

Description of Respondents by their Background and Demographic Variables

Table 3 indicates that about three quarters of the respondents were male. The mean age was 35 years. About 60% of the respondents received recognition due to professional development activities.

Differences in Benefits and Reasons for Undertaking Professional Development Activities

A significant difference in showed benefits and reasons for undertaking professional development activities by location of school. Obtained P value of 0.03 was lower than the priori set alpha level of P=0.05. Thus, teachers from urban schools derived more benefits from undertaking professional development activities compared to teachers from rural schools at an effect size of d=0.07 indicating a difference of little practical importance.

Table 2. Reasons for undertaking professional development activities by senior secondary school agriculture teachers in Swaziland (N=103)

	Agriculture teachers		
Domain	**M**	**SD**	**Rank**
Reason for undertaking professional development is for:			
Competence related reasons	5.14	.72	1
Societal related reasons	5.04	.88	2
Technological related advancements	4.96	1.04	3
Global competitiveness	4.94	.74	4
Curriculum related change	4.75	.91	5
Personal reasons (intrinsic)	4.73	.73	6
Family, peers and significant others	4.68	.95	7
Educational policy	4.49	.99	8
Financial related reasons	4.27	1.17	9
Overall	4.77	.90	

Rating scale: 1= strongly disagree; 2=disagree; 3=slightly disagree; 4= slightly agree, 5 = agree; 6=strongly agree

Table 4. ANOVA table for differences in perceptions of ratings by geographical region regarding benefits and reasons for undertaking professional development activities

	N	M	SD	Statistics	P
Shiselweni	18	4.56	.40		
Lubombo	21	4.83	.70	F = .86	.46
Manzini	36	4.70	.55		
Hhohho	28	4.54	.96		
Total	103	4.66	.69		

P<.05

Table 3. Background and demographic variables of respondents

Characteristics of respondents	Agriculture teachers N=103	
	f	%
Sex		
Female	29	28.2
Male	74	71.8
Age		
23-30	30	29.1
31-40	48	46.6
41-50	19	18.4
51 and above		
M	35.36	
SD	7.59	
Number of professional development programmes attended in the past		
0	18	17.5
1	16	15.5
2	23	22.3
3	15	14.6
4	9	8.7
5 and above	22	21.4
M	3.36	
SD	3.13	
Highest level of education		
Diploma	9	8.7
Bachelor's Degree	84	81.6
Master's Degree	10	9.7
PhD	0.00	0.00
Median	2.00	
Mode	2.00	
Location of school		
Urban	40	38.7
Rural	63	61.2
Distance from school (km)		
Less than 1	28	27.2
1-10	47	45.6
11-20	10	9.7
25-40	9	8.8
41 and above	9	8.9
M	11.15	
SD	19.97	
Marital status		
Single	32	31.1
Married	71	68.9
Teaching experience		
Less than 1	1	1
1-2	12	11.6
3-5	26	25.3
6-10	27	26.2
More than 10 years	37	36
M	10.21	
SD	7.66	
Number of years in current position		
Less than 1	4.00	3.9
1-2	22	21.4
3-5	27	26.3
6-10	22	21.4
More than 10 years	28	27.4
M	8.45	
SD	7.27	
Number of years before promotion		
Not applicable	51	49.5
Less than 1	7	6.8
1-2	4	3.9
3-5	5	4.9
6-10	18	17.4
More than 10 years	18	17.4
M	9.15	
SD	7.82	
Number of development programmes involved in		
None	46	44.7
1-2	44	42.7
3-4	11	10.7
More than 4	2.00	1.9
M	1.60	
SD	1.52	
Recognition due to professional development		
No	41	39.8
Yes	62	60.2

Table 5. Differences in benefits and reasons for undertaking professional development activities by selected background and demographic variables

Independent variables	N	M	SD	t-value	P	D
Sex						
Female	30	4.78	.62	1.11	.27	
Male	73	4.62	.72			
Location of school						
Urban	40	4.85	.71	2.19	.03	.07
Rural	63	4.54	.66			
Marital status						
Single	33	4.52	.70	-1.41	.16	
Married	70	4.73	.69			
Recognition received						
No	41	4.74	.66	.85	.39	
Yes	62	4.62	.72			

P<.05 Means are significantly different. Cohen's descriptors d=small effect size, d≤0.49; medium effect sizes, d=0.50-0.79; large effect sizes, d≥.80.

Relationships Amongst Variables

Table 6 summarizes the relationship amongst variables. A high correlation was observed between the dependent variable, benefits and reasons for undertaking professional development activities and the major independent variable personal reasons for undertaking professional development activities (r=0.74).

Explanatory and Predictor Variables for Benefits and Reasons for Undertaking Professional Development Activities

Table 7 shows the results of Stepwise regression which was used to determine the variables that contributed to the explanation of benefits and reasons for undertaking professional development activities. Multiple regression require that the number of cases substantially exceeds the number of predictor variables used in the regression. The absolute minimum is to have 5:1 as many cases as predictor variables and an acceptable ratio is 10:1 (University of Ljubljana, 2012). In this study, the number of variables to cases was satisfied being 103 cases and 21 independent variables, which was 5:1. Prior to conducting multiple regressions the existence of multi-collinearity among independent variables was checked. Inter-correlations for all the independent variables were conducted to detect collinearity which is a strong association (r= 0.80 or above) between independent variables. High correlations are expected between a dependent variable and independent variables. Highly correlated independent variables are measuring the same thing (Pallant, 2004).

Findings of the study indicated existence of multi-collinearity between the following independent variables: age and teaching experience (r=0.94) and teaching experience and number of years in the current post (r=0.84). The respective variables which were highly correlated were then combined when conducting the regression analysis, since they measure the same thing as suggested by Dlamini (2011).

Four variables were found to explain the benefits and reasons for undertaking professional development activities by senior secondary school agriculture teachers. The variables explained 68% of the cumulative variance.

The major independent variable (personal reasons) explained the greatest variance (55%), curriculum related changes explained (9%), societal related changes explained (2%) and school location explained (2%) of the variance on the benefits and reasons for undertaking professional development activities. The study therefore failed to reject the hypothesis that personal reasons is the major independent variable associated with the benefits and reasons for undertaking professional development activities by senior secondary school agriculture teachers.

Prediction Model for Benefits and Reasons for Undertaking Professional Development Activities

The model specific for this study was therefore:

$Y1= a+b_1X_1+b_2X_2+b_3X_3+b_4X_4……b_kX_k+e$

Benefits derived=0.80+0.49 (personal reasons) +0.20 (curriculum related changes) +0.14 (societal related changes) + -0.20 (school location) + e

Conclusions

The conclusion drawn from this study was that the senior secondary school agriculture teachers derived personal benefits from undertaking professional devel-

Table 6. Correlation coefficients between benefits and reasons for undertaking professional development activities and independent variables

Variable		Correlation coefficient and interpretation
Personal reasons	.74r	Positive and strong association
Curriculum related changes	.61r	Positive and substantial association
Educational policy	.53r	Positive and substantial association
Global competitiveness	.51r	Positive and substantial association
Societal related changes	.55r	Positive and substantial association
Financial reasons (interval)	.34r	Positive and moderate association
Technological related advancements	.49r	Positive and moderate association
Family, peers and significant others	.47r	Positive and moderate association
Competence reasons	.64r	Positive and substantial association
Number of professional development activities involved in	.02r	Positive and negligible association
Number of years in service before promotion	.13r	Positive and low association
Number of years in the current job	.09r	Positive and negligible
Teaching experience	.05r	Positive and negligible
Distance from residential place to school	.17r	Positive and low association
Highest level of education	.12r_s	Positive and low association
Number of professional development activities attended in the past	-.13r	Negative and low association
Age	.07r	Positive and negligible

r – Pearson Product Moment Correlation

r_s – Spearman rho

Table 7. Factors explaining and predicting benefits and reasons for undertaking professional development activities (Stepwise)

Independent variables	R	R^2	R^2 change	B	Beta	t-value	P
Personal reasons	.74	.55	.55	.49	.51	7.30	.000
Curriculum related reasons	.80	.64	.09	.20	.26	3.54	.001
Societal related changes	.81	.65	.02	.14	.18	2.48	.015
School location	.82	.68	.02	-.20	-.14	-2.34	.021
Constant	.80						

Adjusted R^2=.66, Standard error=.41

opment activities such as improving work performance on the job, acquiring more knowledge and building the teachers' competence. Also, that the senior secondary school agriculture teachers were mostly motivated by competence related reasons to undertake professional development. Another conclusion drawn from the research findings of the study was that the teaching of agriculture in senior secondary schools of Swaziland was mostly dominated by male teachers, who held Bachelor's degree; they are married and are mostly in rural schools. Also, that there was a difference of little practical importance in benefits and reasons for undertaking professional development activities by school location. Lastly, no difference was found by sex, marital status, recognition received due to professional development and by geographical regions. From the research findings a conclusion was reached that there was a relatively high association between benefits and reasons for undertaking professional development activities and personal reasons. According to the senior secondary school agriculture teachers they were mainly benefiting intrinsically from undertaking professional development activities.

The implication is that the senior secondary school agriculture teachers should undertake professional development activities in order to increase their knowledge base, become academically effective and reach to more students when teaching. The education and professional development of every teacher must be seen as a lifelong task and be structured and resourced accordingly, in order for the teachers to be more effective and efficient and live up to the expectations of the society (Alston et al., 2003). The senior secondary school agriculture teachers are mostly self-motivated to undertake professional development (Schieb and Karabenick, 2011).

Some competence factors were the main reason for undertaking professional development activities. A need, therefore, is for providers of professional development activities to re-evaluate the content of in-service for teachers in order to provide timely knowledge and skills competence. Teachers who undertake professional development activities should be given accelerated promotion and access to qualification upgrading opportunities, in order to fulfill their inner quest. An educational policy must be put in place for senior secondary school agriculture teachers to attend professional development activities after every five at least, years in order to cope with changes that are taking place regionally and globally.

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Identifying Key Characteristics for Student Farm Successes through a National Delphi Study

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Abstract

Sustainable agriculture education programs continue to increase nationwide with many inquiry-based educational activities occurring on student farms. Student farms are defined as associated with educational or college institutions that provide diverse, hands-on educational experiences in agriculture. While student farms provide multiple benefits primarily to students, few studies have examined successes, challenges and educational strategies for utilization of these farms. In an effort to fill these gaps, we surveyed student farm leaders including farm managers and associated faculty from 24 college and university student farm programs nationwide. We utilized a three-round, online modified Delphi survey to collectively gather and rank student farm leaders' perceptions of five key student farm characteristics including: 1) successful components for establishment and long-term management; 2) educational and outreach strategies for students and community; 3) challenges, issues and solutions; 4) funding resources and strategies; and 5) ideas for future educational and outreach activities. Results demonstrated the importance of having an experienced farm manager; diverse interdisciplinary educational strategies primarily for students and some for community and the need for strong institutional support. These findings are important both for newly established farms as well as those already developed as student farms are becoming an increasingly important tool for providing the experiential educational foundation to university-based sustainable agriculture education programs.

Introduction

Driven by increasing student interest, a growing number of sustainable agriculture and related food system education programs have developed nationwide (Parr and Trexler, 2011). While sustainable agriculture education (SAE) programs may differ in name and emphasis, they share important characteristics including a multidisciplinary curriculum and a variety of experiential learning opportunities (Parr et al., 2007; Trexler et al., 2006). Moreover, many of the hands-on sustainable agriculture learning take place on student farms (Bettman, 2011; Sayre and Clark, 2011). While student farms may also differ in their emphasis and activities, they are defined as associated with educational institutions and providing students with diverse experiential learning opportunities across broad disciplinary areas of sustainable agriculture (Parr and Trexler, 2011). As SAE programs increase, so do the number of student farms. Sayre and Clark (2011) reported over 80 student farms associated with various colleges and universities nationwide. Moreover, student farms are attracting diverse students, many from non-agricultural backgrounds interested in learning sustainable food production methods outside the classroom (Feenstra et al., 2008; Markhart, 2006). A wide range of educational programs including apprenticeships, internships, workshops and beginning farmer-training programs are developed on student farms. Student farms are critical facilities training future producers and educating food-system leaders through diverse learning opportunities in sustainable agriculture production, marketing, research, community engagement and professional development (Parr and Trexler, 2011).

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Student farms provide the educational foundation of experiential learning for many SAE programs nationwide (Leis et al., 2011), yet there is a lack of research examining their challenges, successes and diverse educational strategies. Newly established student farms often struggle with a myriad of issues that could be avoided by learning from existing student farms. No formal network of communication exists for student farms nationwide although informal communication often occurs among student farm leaders. While the Sustainable Agriculture Education Association (SAEA, http://sustainableaged.org/) lists student farms nationally and some student farm leaders attend the associated biennial conference, no network exists to for student farms to communicate on an ongoing basis. Research devoted to identifying educational and outreach activities, current challenges and successes among student farm leaders can serve as a vital resource to new student farms, as well as creating a dialogue among established farms.

At the same time as students are increasingly attracted to student farms, community interest in sustainable and local food production is also growing. Nationwide, various communities are establishing highly productive community gardens and are searching for sustainable agriculture educational resources (Teig et al., 2009). These community gardens provide numerous benefits to individuals in the form of increasing physical health, developing skills in planning, organization, team-building and financial management and providing a source of fresh food (Bradley and Baldwin, 2011; Draper and Freedman, 2010). While there is much enthusiasm for community gardens, they can suffer from a lack of resources and SAE materials among other challenges. Consequently, this can create a divide between a community gardens' need for up to date sustainable agriculture information and university-level research (Pawelek et al., 2009). While student farms focus primarily on SAE for students, they may lack focused community engagement activities outside of marketing opportunities. Student farms may not interact with community gardens at all, further deepening the divide between institutions and local initiatives. There is great potential; however, for student farms to increase engagement with surrounding community gardens that is mutually beneficial, enhancing sustainable agriculture information, innovative research and resource exchange among the institution, students and community. Some student farms are engaging with community in innovative ways, yet there is a lack of research and communication highlighting these efforts.

Purpose and Objectives

The purpose of this study was to describe successful components, educational strategies and challenges of student farms from the perspective of national student farm leaders. Twenty-four student farms nationwide and their associated farm leaders, including both farm managers and administrative faculty, participated in this study. We used a Delphi survey methodology to identify and collectively prioritize student farm leaders' perceptions of five key student farm characteristics, including:

1. Successful components for establishment and long-term management
2. Successful educational and outreach strategies for students and community members
3. Most significant student farm challenges, issues and their potential solutions
4. Current funding resources and strategies
5. Ideas for future educational and outreach activities

The major motivation for this study was to learn from other student farms and synthesize that information to help others avoid potential pitfalls that commonly affect student farm development and establishment. We also hope to encourage a new model for student farms that provide unique SAE for both students and community, which is why we included questions about educational strategies for both of these audiences in the study. Results from this study can be instrumental in identifying key components for successful day-to-day operations and long-term sustainability of student farms, as well as initiating a dialogue among student farm leaders nationwide.

Materials and Methods

Delphi Study Design

We used a Delphi technique to examine the experiences and perspectives from various student farm leaders across the country. The Delphi survey technique was most appropriate for this study because it allowed for the systematic collection, aggregation and consensus of informed perspectives from an expert group on specific questions and issues (McInturff, 2009). Because Delphi studies focus on a group of selected experts, the number of respondents is typically small, thus these studies are not intended to produce statistically comparable results (Okoli and Pawlowski, 2004). Experts participate in a number of sequential questionnaires that build off all the responses from the preceding questionnaires (Okoli and Pawlowski, 2004). This Delphi study involved three rounds of questioning through an online survey. The NCSU Institutional Review Board (IRB) for the Protection of Human Subjects in Research approved the survey March 2, 2012, prior to initial survey distribution to the participants.

Target Audience, Data Collection and Analysis

We aimed to include a regional diversity of student farms from institutions throughout the country. We used the SAEA Student Farm Directory (http://sustainableaged.org/projects/student-farms/) and respective program websites to gather the list of associated leaders (farm managers, faculty/farm director or any institutional administrator). On March 27, 2012 we sent an e-mail invitation to student farm leaders from 34 student farms that were active on the SAEA Student Farm Directory, representing a diversity of private and public colleges, land-grant universities and community colleges span-

Table 1. Student farm program participants in Rounds 1-3 of Delphi study.

Type of Institution	Number of Participating Programs	Number of States Represented Nationwide
Community college	1	1 (NC*)
Liberal arts college	6	6 (AZ, KY, NC*, OR, PA*, VT)
Land-grant university	10	10 (CA*, FL, GA, IA, ID, MI, NJ, NM, PA*, SC,)
Private research university	2	2 (CA*, NC*)
Public university (other)	5	4 (CA*, MT, NC*, WA)
	Total Number of Participating Programs	Total Number of States Represented Nationwide
	24	17

*States with more than one participating student farm program (CA, PA, and NC).

Figure 1.

Map of college and university student farm programs initially contacted to participate in Delphi study (N=34).

ning 23 states (Figure 1, Table 1). The entire survey process (Rounds 1, 2 and 3) finished on July 23, 2012.

We used the NCSU College of Agriculture and Life Sciences (CALS) Survey Builder software to create the online surveys. The first survey (Round 1) was used to develop a comprehensive list of open-ended responses to ten questions that examined survey participants' perspectives of five key student farm characteristics including: 1) successful components for establishment and long-term management; 2) successful educational and outreach strategies for students and community; 3) student farm challenges, issues and potential solutions; 4) current funding resources and strategies; and 5) ideas for future educational and outreach strategies for student farms. A panel of experts in Crop Science, Horticulture Science, Soil Science and Agricultural and Extension Education departments at NCSU helped develop the content and validity of these questions. Because the responses from Rounds 1 and 2 were very lengthy, they are considered as part of the Delphi process and not presented as results here. Only the prioritized list from Round 3 is presented as results of this study (Tables 2-6). Round 2 consisted of coding and collating the previous round's responses and then resubmitting all answers back to each participant. The participants then reviewed all responses and had 7 weeks to revise any previously made statements or add new responses to the list. In Round 3, a final comprehensive list of responses was generated and participants were asked to rank the importance and/or relevance of each response using a 1-5 Likert-type scale (Likert, 1932). Data was collected with the CALS Survey Builder and then transferred it into Microsoft Excel (Excel 2007, Version 12.3.6) for analysis. Once all responses were rated, the five to ten top rated responses to each question were identified using descriptive statistics (mean and standard deviation) and graphed.

Results and Discussion

Initially, 53 individuals from 34 student farm programs were invited to participate, with a total of 24 possible individuals (45%) across 24 farm programs (71%) completing Round 1. Minimal attrition occurred from Round 1 to 2 and remained the same from Round 2 to 3. A total of 265 unique responses were generated from the ten survey questions in Rounds 1 and 2. Each question generated at least 17 responses (mean = 27, maximum = 40).

Successful Components for Establishment and Long-Term Management

The first category of questions identified the most successful components contributing to student farm establishment and long-term management. Student farm leaders highly ranked the importance of having a full-time and experienced farm manager and it was top on the list for each of the three questions related to characteristics of successful student farms (Table 2). Similarly, Biernbaum (2011) stressed the importance of hiring a capable farm manager that additionally possesses passion and a commitment for experiential learning and group dynamics. Other highly ranked responses emphasized the importance of focusing on education, experiential learning and demonstration of sustainable agriculture practices (Table 2). Experiential learning opportunities are recognized as extremely important for SAE (Parr et al., 2007). While there are many ways to offer experiential learning opportunities, student farms, especially accessible to students, can provide year round student learning and investigation. Many student farms are started by and staffed by students, but drawing from the collective expertise of student farm leaders in this study, the long-term success hinges on supporting a full time farm manager well (including benefits, vacation time, etc.). Van Horn (2011) described the importance of creating a full-time farm manager position during the developmental years of the University of California (UC) Davis Student Experiential Farm (SEF). The UC Davis SEF farm manager is additionally supported by other part-time staff positions to meet the growing needs and program offerings (Parr and Van Horn, 2006). Other highly ranked successful student farm components in this study included competent and committed staff, land tenure, administrative support and a steady source of funding (Table 2). Participants also highly ranked student involvement and student sense of owner-

ship as successful student farm components. Trexler et al. (2006) similarly found practical experiences, student governance and shared responsibilities as highly ranked necessary experiences for SAE curricula from various agricultural practitioners nationwide. This may indicate allowing experienced students to make some managerial decisions or having apprentice-type roles on student farms. This can help provide lateral mentoring opportunities for more experienced students to train lesser-experienced students on farm.

Successful Educational and Outreach Strategies

The second category of questions identified successful educational and outreach strategies for both students and community members on student farms. Student farm leaders identified internships and opportunities to use farm equipment as two of the top ten ranked educational strategies for students (Table 3). Interdisciplinary learning from diverse guest/faculty lectures, summer courses for both graduate and undergraduate students and organic farm production training were also ranked highly as effective educational strategies for students. Interdisciplinary learning in SAE should be broad, integrating natural and social science knowledge, skills and understanding (Parr and Van Horn, 2006). Other highly ranked responses included student participation in community supported agriculture programs (CSA; where individuals purchase a weekly production share prior to the season), tours and events and research projects (Table 3), which can enhance students' personal and professional development, in addition to increasing agricultural production skills.

A variety of successful educational and outreach strategies designed to engage community members was also identified by survey participants. One of the most highly ranked successful strategies for community outreach was growing and selling produce from the student farm in a CSA program (Table 3). CSA programs are common within various student farms (Ngouajio et al., 2006), providing marketing education to students and generating revenue. They also can provide opportunities for students to develop communication and organization skills with consumers, as well as recognize the importance of a contractual agreement between the student farm and outside parties (Slotnick, 2011). Additional top ranked community outreach strategies included hosting tours for general community and K-12 audiences, farmer training programs, volunteer workdays and connecting with local non-profit organizations (Table 3). Some student farms also donate food to food banks and related community organizations. Slotnick (2011) of the University of Montana's Program in Ecological Agriculture and Society Farm (PEAS), described one of their main initial community engagement strategies was developing the student farm as joint non-profit and university venture that grows food for the local food bank and educates students in the process. Through community engagement strategies like these and others, student farms can go beyond the scope of education focused just on students, but further rooting the student farm as an integral piece of the community.

Challenges, Issues and Potential Solutions for Managing Student Farms

In the third category of questions, survey participants were asked to identify the most significant challenges, issues and potential solutions on student farms. Challenges were described as something that may occur on a daily basis, distinct from issues that were

Table 2. Student farm leaders' mean (M) ranked responses and standard deviation (SD) from Round 3 from three questions that identify successful components for student farm establishment and long-term management. Total number (n) of different responses from participants in Rounds 1-2 is included for each question.

	Category: Successful Components for Student Farm Establishment and Long-Term Management	M	SD
Rank	Question 1. Characteristics of a successful student farm (n=40)*		
1	Experiential learning is key	4.80	0.41
2	Fulltime farm manager	4.75	0.55
3	Demonstrates sustainable agriculture practices	4.72	0.46
4	Competent staff	4.70	0.47
5	Educationally focused	4.70	0.47
	Question 2. Components necessary for the establishment of a new student farm (n=34)*		
1	Experienced farm manager	4.65	0.67
2	Fulltime farm manager	4.60	0.68
3	Land (acquisition and tenure)	4.55	0.51
4	Startup budget	4.50	0.61
5	Committed team members with team-based and leadership qualities, and desire to involve others	4.45	0.60
	Question 3. Factors contributing to sustain long-term management of a successful student farm (n=26)*		
1	Experienced and dedicated farm manager and staff	4.75	0.55
2	Administrative support (personnel and funding)	4.60	0.50
3	Effective communication	4.60	0.50
4	Enthusiastic and positive attitude	4.50	0.61
5	Faculty support	4.45	0.60
6	Farm manager has proper benefits, vacation time, is treated well, etc.	4.40	0.75
7	Students feel sense of ownership and importance at farm	4.40	0.60
8	Teamwork/team based	4.40	0.69
9	Agriculturally and technically proficient	4.35	0.59
10	Maintains student involvement and interest in summer months (when most students leave)	4.35	0.89

*Rating Scale: Not Important (1), Minimally Important (2), Somewhat Important (3), Important (4), Very Important (5).

Table 3. Student farm leaders mean (M) ranked responses and standard deviation (SD) from Round 3 from two questions that identify successful educational and outreach activities for college/university students and community members on student farms. The total number (n) of different responses from participants in Rounds 1-2 is included for each question.

	Category: Successful Educational and Outreach Strategies for Students and Community Members	M	SD
Rank	Question 4. Successful educational and outreach strategies for college/university students on student farms (n=24)*		
1	Student internships	4.42	0.69
2	Students practice using farm equipment	4.26	0.81
3	Interdisciplinary undergraduate and graduate classes involved with farm during summer months	4.22	0.88
4	Guest lecturers (agriculture-related and interdisciplinary)	4.16	0.69
5	Organic farmer course taught on-farm	4.12	1.22
6	CSA	4.05	0.83
7	Community tours and events	4.00	0.92
8	Undergraduate and graduate research projects involved with farm	4.00	0.94
9	Social events on farm	3.9	1.07
10	Host farm tours and field trips	3.89	1.05
	Question 5. Successful educational and outreach strategies for community members on student farms (n=17)*		
1	CSA	4.26	1.05
2	Host tours (K-12 and/or home-school)	4.16	0.90
3	Farmer's markets/plant sales	4.15	1.14
4	Host tours (general community)	3.79	1.08
5	General community education workshops hosted by farm staff	3.53	1.12
6	Host professional disciplinary and interdisciplinary speakers	3.47	1.13
7	Connection with local non-profit that runs youth children programs, curriculum design, and teacher training	3.41	1.18
8	Farmer training programs	3.40	1.40
9	Non-profit partnership	3.24	1.44
10	Farm available to campus and community for events (fundraising, annual harvest festivals, donations, etc.)	3.21	1.53

* Rating Scale: Not Successful (1), Minimally Successful (2), Somewhat Successful (3), Successful (4), Very Successful (5)

Table 4. Student farm leaders mean (M) ranked responses and standard deviation (SD) from Round 3 from three questions that identify most significant student farm challenges, issues, and potential solutions. The total number (n) of different responses from participants in Rounds 1-2 is included for each question.

	Category: Most Significant Student Farm Challenges, Issues, and Potential Solutions	M	SD
Rank	Question 6. Greatest Challenges for Establishing and Managing a Successful Student Farm (n=27)*		
1	Constant funding	3.55	1.10
2	School bureaucracy/red tape	3.20	1.20
3	Lack of administrative and institutional support	3.05	1.36
4	Staff burnout	3.05	1.15
5	Equipment management	3.00	0.86
6	High student turnover	3.00	1.12
7	Organizing/working around student schedules	2.95	1.05
8	Farm visibility (college/university wide)	2.90	1.12
9	Torn between production and educational foci	2.90	1.07
10	Maintaining enthusiasm and positive attitude during difficult times	2.85	1.27
	Question 7. Greatest Issues for Establishing and Managing a Successful Student Farm (n=30)**		
1	Lack of time	3.40	1.31
2	Continuous funding	3.25	1.25
3	Difficulty to make a living in agriculture	3.25	1.16
4	Data collection and documenting results from educational outcomes is difficult	3.10	1.07
5	Sustaining full institutional support (trustees, administration, faculty, etc.)	2.95	1.54
6	Difficulty when working with various organizations (acquiring building permits, livestock permits, licensing, city irrigation regulations, etc.)	2.85	1.04
7	Balancing production focus with educational focus	2.80	1.11
8	Lack of explicit system for student shared governance	2.70	1.45
9	Expressing the real value of the farm to others (college/university and community)	2.65	1.09
10	Increasing privatization of public university results in less support for experiential educational programs	2.65	1.42
	Question 8. Practical Alternatives and Solutions For When Managing a Successful Student Farm (n=22)***		
1	Experieneced farm manager	4.70	0.57
2	Clear communication between farm staff and students	4.50	0.61
3	Enthusiastic and positive attitude	4.50	0.51
4	Establish positive relationships with administrative support from "home department"	4.50	0.61
5	Creating a sense of ownership for students	4.35	0.75
6	Having a clear farm vision and long-term plan	4.35	0.67
7	Communicating and marketing the multiple benefits of student farms to others	4.30	0.67
8	Start small and continue to be realistic	4.30	0.80
9	Securing constant funding	4.26	0.56
10	Having a strong management team, chain of command, shared governance structure and all roles for all parties (students, faculty, staff, and administration) are clearly defined	4.25	0.55

* Rating Scale: Not Challenging (1), Minimally Challenging (2), Somewhat Challenging (3), Challenging (4), Very Challenging (5);
**Rating Scale: Not an Issue (1), Minimally an Issue (2), Somewhat an Issue (3), Issue (4), Very much an Issue (5);
***Rating Scale: Not Important (1), Minimally Important (2), Somewhat Important (3), Important (4), Very Important (5)

larger, on-going problems. It was not surprising that one of the top responses for the greatest day-to-day challenges was securing constant funding (Table 4). In a similar study that surveyed challenges on student farms throughout the United States, Leis et al. (2011) found working with a limited budget and gaining administrator support were significant challenges. Participants in his study also highly ranked lack of administrator and institutional support as a significant challenge. Other highly ranked challenges found in this study included institutional bureaucracy, staff burnout, equipment management and high student turnover. Another highly ranked challenge was being torn between the sometimes competing goals of increasing production and optimizing educational experiences on the student farm (Table 4). While a growing number of student farms rely on farm sales and CSA programs to support the operations (Leis et al., 2011), the responsibility to meet these contractual obligations may at times require sacrificing a teachable moment in order to meet the production demands (Slotnick, 2011).

Highly ranked issues identified by student farm leaders were similar to the challenges but there was slightly less agreement indicated by the higher standard deviation values compared to other questions. Top issues included lack of time, lack of continuous funding, difficulties of making a living in agriculture, documenting results from educational outcomes and difficulties of working with other organizations or city policies (Table 4). Other highly ranked issues included lack of a system for student shared governance and challenges in expressing the farm value to others.

While many of these constraints are not new, a unique aspect of this study was to ask student farm leaders to identify the most practical solutions to commonly observed challenges and issues on student farms. One of the highest ranked solutions identified was having an experienced farm manager (Table 4). Throughout our study, the importance of employing an experienced and dedicated farm manager was continually identified as critical to the success of a student farm in both the establishment and long-term sustainability. While students and faculty have been critical in providing the grass roots efforts, enthusiasm and initiative to get student farms started, students turnover quickly and faculty are often too busy to provide the needed focus. A farm manager, if well supported (e.g., adequate salary, benefits, time off, farm budget and resources), can provide the consistency, documentation and historical knowledge of the land as well as the campus political environment to support successful production and most importantly, SAE to various learners on the farm. Student farm leaders also identified a diversity of other highly rated solutions, ranging from clear communication between farm staff and students, sustained enthusiasm, establishment of positive relationships with administrative supporters from the home department, documentation of a clear vision and long-term plan, a sense of ownership with students and securing constant funding (Table 4). While some of these solutions may resonate more than others with different student farms, it is clear that student farms are attracting new students to agriculture and providing critical spaces for experiential learning (Parr and Trexler, 2011; Sayre and Clark, 2011). Student farms are assets to the universities both for enhancing experiential education in sustainable agriculture and community engagement (Sayre and Clark, 2011) and should be supported as so.

Current Funding Resources and Strategies

While funding is a recognized challenge, student farms have diverse strategies for support. One of the highly ranked funding strategies identified by student farm leaders was demonstrating the farm as a viable asset to the college/university (Table 5). Encouraging diverse university courses and student groups to utilize the student farm may be a way to do this. This could also take the form of documenting diverse educational outcomes, including those that are transformative and distinct from farming skills such as gaining confidence, critical thinking and civic engagement (Biernbaum, 2011). Other highly ranked funding strategies identified were institutional support, CSA programs and market revenue from on and off campus sales, grant funding and tuition/registration fees (Table 5). Student farms are critical foundations of university SAE programs and it is important to communicate effectively the various student and community benefits from student farms to institutional administrators, campus leaders and to the surrounding community as a preliminary fundraising strategy. Dining hall purchases and funding through established foundations were also identified as effective funding strategies, but at a lower rank. Dining hall purchases can also can extend the education and outreach of the student farm on campus to a greater number of students that may not be able to visit the farm. These may be underexplored resources with increasing importance in the future. Bettman (2011) described the importance of foundational funding through a local donor and support from the university department to the survival of the University of Oregon's Urban Farm. Funding examples such as these emphasize importance of having diverse strategies for student farms from university support, grants, sales and fundraising in the community.

Ideas for Future Educational and Outreach Activities

Student farm leaders generated a variety of ideas for future educational and outreach activities from undergraduate and graduate courses taught on the farm, increasing the diversity of on-farm education, dining hall programs, food bank donation programs, train the trainer workshops, service learning and others (Table 6). Some of these are already in place on student farms and provide examples to learn from, yet an effective communication network among student farms to discuss these and other successful strategies is lacking.

Table 5. Student farm leaders mean (M) ranked responses and standard deviation (SD) from Round 3 that identify current funding resources and strategies. The total number (n) of different responses from participants in Rounds 1-2 is included for each question.

	Category: Current Funding Resources and Strategies	M	SD
Rank	Question 9. Funding Strategies Used for Successful Student Farms (n=21)*		
1	Demonstrate farm is a viable asset for university (strategy)	4.30	0.73
2	Institutional support	4.25	1.12
3	Market revenue (on and off-campus)	4.20	1.20
4	CSA	4.00	1.25
5	Grant funding	3.84	1.38
6	Class/tuition/registration fees	3.55	1.54
7	Demonstrate farm is a viable asset for community (strategy)	3.44	1.25
8	Dining hall purchases	3.10	1.55
9	Foundation funding	3.00	1.5
10	On-campus sales (special programs)	2.94	0.94

*Rating Scale: Not Important (1), Minimally Important (2), Somewhat Important (3), Important (4), Very Important (5)

Table 6. Student farm leaders mean (M) ranked responses and standard deviation (SD) from Round 3 that identify future educational and outreach activities on student farms. The total number (n) of different responses from participants in Rounds 1-2 is included for each question.

	Category: Ideas for Future Educational and Outreach Activities on Student Farms	M	SD
Rank	Question 10. Possible Future Educational and Outreach Strategies on Student Farms (n=24)*		
1	Undergraduate and graduate courses taught on-farm	4.42	0.84
2	Diversity on-farm lessons (examples: wildlife biology, post-harvest physiology, animal production systems, value-added projects, mushroom cultivation, energy conservation, cooking courses, etc.)	4.35	0.75
3	Dining hall programs	4.26	0.99
4	Food bank donation programs	4.21	1.03
5	Train-the-Trainer workshops	4.11	0.99
6	Innovative on-farm energy projects and demonstration areas	4.00	0.97
7	Service-learning opportunities	3.95	0.71
8	Student-taught laboratories and field activities	3.95	0.85
9	Fundraising activities and social events	3.94	0.80
10	Graduate research efforts	3.94	1.26

*Rating Scale: Not Possible (1), Minimally Possible (2), Somewhat Possible (3), Possible (4), Very Possible (5)

Conclusions and Recommendations

Student farms have provided important venues for students (and community) to gain practical experiences in sustainable agriculture, in addition to skills in problem solving, decision making, effective communication and team work (Sayre and Clark, 2011). Student farms can also incubate new SAE programs rooted in experiential learning and critical thinking (Van Horn, 2011). Student farms also provide important and sometimes under recognized benefits as they continue to attract new students to agriculture and to the universities that they are located at (Leis et al., 2011). This study fills a critical knowledge gap by identifying the collective successes, challenges, solutions and diverse educational activities occurring on a diversity of student farms across the nation. One of the main findings from this study was the importance of supporting farm manager for the establishment and long-term success of student farms. A farm manager was also identified as an important solution to common challenges and issues.

This study also describes the diverse educational strategies employed on student farms. Although most activities are focused on students, there were a number of educational activities identified for the community. Opportunities to increase community engagement and student-community learning exchanges on student farms can foster greater partnerships between the campus and community and extend SAE to a greater number of people. Ideas for future educational and outreach activities on student farms included increasing the diversity and disciplines of courses taught on-farm, research projects, dining hall purchases, food donations and service learning opportunities. These learning opportunities and innovations on student farms cannot be realized, however, without addressing some of the major funding, college/university support and other challenges identified in this study. From the growing student enthusiasm and engagement on student farms nationwide, there is no indication of this movement slowing down anytime soon. Future studies and increased communication and collaboration among student farms will collectively benefit all and push the boundary of what is possible on student farms.

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Faculty Define the Role of Writing in the Social Sciences of Agriculture

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Abstract

Faculty members who teach writing-intensive courses in the social sciences of agriculture defined writing using four themes—writing in agriculture, characteristics of effective writers, teaching writing and writing factors. Writing, as described by faculty, is a window to the brain and helps students retain and transfer knowledge. Therefore, effective writers have an imagination, a dedication to communicating, an understanding of style, a framework for writing, an inquisitive mind, a motivation to write and a want to know more. To become critical thinkers and knowledge creators through writing, students should present and defend a topic to a variety of public audiences, write repetitively and receive rich, timely feedback. Additionally, implementing reading assignments in writing-intensive courses helps students understand the real-world application of writing as well as the language of their discipline. Writing instructors should spend more time, however, linking writing to learning at the beginning of class, explaining how writing can help students learn more about their disciplines and discussing how to transfer writing skills. More research needs to be conducted on each one of the writing factors to determine at what level they impact critical thinking and knowledge creation, if in fact they do at all.

Introduction

In the past, faculty members contended it was not their responsibility to teach writing (Cobia, 1986; Kitzhaber, 1963; Stewart, 1987) because teaching content is an educators' first priority (Zhu, 2004). Writing, though, is a part of every discipline and cannot be taught isolated from it (Grimes, 1986). Strachan (2008) argued that learning the language of a discipline is part of gaining knowledge in the discipline. Language, as defined by Strachan (2008), is a discipline's "*vocabulary, conventional sentence structures, patterns of organization and reasoning, [and] modes of audience address*" (p. 50). Therefore, learning the language is an essential skill for a successful career (National Commission on Writing, 2003; Reynolds, 2010).

In 2003, the National Commission on Writing proclaimed that writing education needed transformation and since that time, writing within the discipline has invaded college campuses. According to Hudd et al., 2013, writing instructors have two roles: coaches who guide the creative and discovery process and teachers who help students understand writing conventions and standards within the discipline. Bean (2011) argued that students fail as writers because of writing instructors lack of effort to teach writing. Teaching writing is time consuming (Bok, 2006), but Soven (1986) suggested it cannot be eliminated at the cost of teaching content. If faculty focus more on helping their students during the development stages of the writing process, it would eliminate hours spent providing summative feedback at the end of the project (Schiff, 2010).

In separate studies more than two decades apart, faculty recognized their lack of skills to teach discipline-specific writing (Cobia, 1986; Rocca, 2010). "*No way! Are you crazy? I don't have enough time to grade all that stuff. Besides, what business do I have teaching writing skills? I can't write myself. I can't recognize poor mechanics let alone teach someone else to write properly. I'm not trained in writing; it's not my job*" (Cobia, 1986, p. 22). Although faculty in Cobia's study seemed to lack the desire to learn how to teach writing, Rocca (2010) found faculty showed a moderate to high level of interest in improving their ability to teach writing even though they recognized their lack of skills.

Purpose/Objectives

The purpose of this qualitative study was to define writing in the social sciences of agriculture using semi-structured interviews with faculty who teach writing-intensive courses at Texas A&M University. Three research questions guided this study:

1. Is writing important in the social sciences of agriculture?
2. How do faculty in the social sciences of agriculture teach writing?
3. What are the writing factors that augment critical thinking and create knowledge?

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Context of Study

Texas A&M University is a research university that enrolls more than 55,000 students pursuing bachelors, masters and doctoral degrees. Each Texas A&M undergraduate student is required to complete two writing/communication intensive courses as part of the Communications in the Disciplines program. Students have a choice in how they can meet the program's requirement: one writing-intensive course (W course) and one communication-intensive course (C course) or take two writing-intensive courses (Texas A&M University Writing Center, 2014).

W courses are courses within the discipline and content area that integrate writing as a way to demonstrate knowledge and/or reinforce learning (Texas A&M University Writing Center, 2014). The course must be within the students' major and require writing that is related to the type of writing students will be expected to do within the industry. Students must be given the opportunity to improve the major writing assignments incorporated in the course and be provided writing instruction throughout the writing process. According to the Texas A&M University Writing Center (2014), writing assignments should be used as a method of learning and teaching course content and should inspire students to be creative, use critical thinking skills and take ownership of their writing. Additionally, the writing assignments must account for 33% of a three-credit hour course (Texas A&M University Writing Center, 2014).

Therefore, faculty of each department in the College of Agriculture and Life Sciences were required to identify, design and teach courses that met the program requirements. Faculty, many of whom have not been trained to teach or assess writing, have taught and continue to teach courses that incorporate writing assignments and tasks representative of the writing tasks students encounter as professionals. The faculty in this study represented three social science departments–agricultural economics; agricultural leadership, education and communications and recreation, park and tourism sciences. The study was limited to the social sciences because those faculty work with the institution of human society as it relates to agriculture and because of the diverse scientific disciplines and writing contexts in agriculture. Because the study only included a limited number of faculty in each department, the findings may not be exhaustive or completely representative of the faculty as a whole. The faculty who teach writing-intensive courses are experts in their field but are not necessarily experts in writing. However, they have been deemed credible by their peers to serve as experts pragmatically through teaching writing-intensive courses.

Method

In 1981, Farr claimed that writing research needs to begin with the practicality of teaching writing and that writing instructors should be a part of the research process and question development. Therefore, because this study was the first phase of a larger, more in-depth research project, semi-structured interviews (Lindolf and Taylor, 2011) with faculty members were used to describe writing in the social sciences of agriculture. Purposive sampling (Wiersma and Jurs, 2005) was used to identify the population for the study. Faculty members who taught a writing intensive course during the fall 2011 and spring 2012 semesters were selected because they had taught a writing-intensive course recently. The search yielded 22 faculty members in the social sciences of agriculture. One faculty member was pulled from the population because of the absence of contact information.

Faculty members were then randomly selected from the sub sample because Wiersma and Jurs (2005) recommended randomly sampling the purposive sample if the purposeful number exceeded the number of interviews that needed to be conducted. Twelve faculty members were emailed or spoken to, ensuring at least eight would participate in the study. Data collection began after the research protocol was approved by the Institutional Review Board. The point of data saturation was reached because the eighth interviewee generated no new data (Baker and Edwards, 2012). Of the sample, at least two faculty represented each department. One department had four representatives because of its diverse programs. Five faculty were non-tenure track and three faculty were tenure track.

Each faculty member was assigned a code to maintain confidentiality. The code included a descriptor (NNT = non-tenure track; TT = tenure track) and a unique number. The faculty were coded as non-tenure track and tenure track because the expectations and teaching responsibilities are different for the two groups. Therefore, the perspectives on teaching writing and the level of involvement with their students could be evidenced in the study's results.

Interview questions were developed based on the researcher's concerns as a writing instructor and researcher, a review of literature and prominent theories and conceptual models of writing. Questions focused on faculty members' definitions of writing-intensive courses, description of writing-intensive courses in their disciplines, experiences as writing-intensive course instructors and perspectives of writing in their disciplines. The interview questions and protocol were tested, revised and modified using a pilot study interview and the interview protocol was revised as necessary after each interview.

The interviews were transcribed, coded and analyzed using qualitative research procedures recommended by Lindolf and Taylor (2011) and interview transcripts were coded using an open coding technique (Strauss, 1987). The categories, codes and sub codes were reconciled and the interviews were compared for similarities. Triangulation was achieved through interviews, field notes, reflective journal and data collection using other research methods with similar populations (Lindolf and Taylor, 2011). A thick description of the data and exemplars was used as a framework for the nar-

rative (Lindolf and Taylor, 2011). An audit trail of initial analyses, definitions of codes and categories, field notes and coded samples were kept to maintain dependability (Lincoln and Guba, 1985).

In addition, during the spring and summer 2012 semesters, the researcher kept a reflective journal about her experience as a writing intensive course instructor and reflected back on the experience as she analyzed the findings. "The qualitative analyst owns and is reflective about her or his own voice and perspective" (Patton, 2002, p. 41) as the data collector and interpreter (Merriam, 2009). The researcher's position helps the reader to clarify how and why the data were interpreted (Merriam, 2009). The researcher collected and analyzed the data based on her experience balancing teaching, research and graduate student responsibilities while meeting the demands of teaching a writing-intensive course. Although she has experience teaching writing, unlike some of the faculty she interviewed, she felt the stress of balancing responsibilities with the increased demand of grading and teaching an essential life skill. Patton (2002) stated a strength of naturalistic qualitative research is that a researcher is part of the phenomena being investigated so the situation can be better understood. The researcher's experience helped her understand the faculty's attitudes about and ideas of being a writing-intensive course instructor.

Findings

Faculty members who teach writing-intensive courses in the social sciences of agriculture defined writing using four themes—writing in agriculture, characteristics of effective writers, teaching writing and writing factors.

Writing in Agriculture

Writing is a mechanism that moves a student from "a number cruncher to a good decision maker" (TT02). Even though it is a valued skill in the workplace and is important in the decision making process (TT02), it is often undervalued in schools (NTT03). A non-tenure track faculty member (NTT02) emphasized that an employer's first impression is often writing ability–"to establish professionalism, to establish diligence, to establish patience" in communication and information delivery.

Writing is a "multi-circular process" (TT03) that takes time because editors and multiple points of revision contribute to effective writing (NTT03). The first draft is never finished, but "if you go through the right process, the end product will be there" (NTT03). Students do not know, though, how to write something, set it aside for a day or two and come back to it later (TT03). Additionally, students should proofread paper copies and not online copies (TT02). "*Print it out and go away. Read it later. Hand in a paper copy. You notice typographical problems when you print it out*" (TT02).

More than a process used to disseminate information, writing is a method of assessing students' knowledge about a topic (TT01) because it is a "*window into the brain in terms of how people think, how they make and support arguments and how they solve problems and use resources*" (TT01). It requires them to struggle with their own ideas and put those ideas on paper in an organized way (TT01; TT02). Students "transfer knowledge from thoughts to paper" and communicate a vision when they write (TT01). Writing has the ability to help students think about things in deeper, more complex ways and think about how to apply information. But, many of them sit down and write like they think—"stream of consciousness, regurgitating their thoughts, not planning how they are going to say it" (TT01).

Though writing is important and it is often an employer's first impression, students, many times, do not have the confidence or patience to start writing, revise their work, clearly state ideas and thoughts, make decisions and judgments and proofread (NTT02; TT02). A challenge is balancing "the patience of let's bang this out real quick and let's make it good and revisit it next week without that repetition of doing it over again and without getting them to be negative toward it" (NTT02).

Characteristics of Effective Writers

Faculty explained that effective writers have certain characteristics that set them apart from ineffective writers (Table 1). Effective writers have an imagination, a dedication to communicating, an understanding of style, a framework for writing, an inquisitive mind, a motivation to write and a want to know more (NTT04). Writing is an "expression of thinking" (TT01) and "the thought process of the continuum—the logical flow" (NTT02).

Table 1. Characteristics of Effective Writers

Characteristic	Participant ID
Be clear, concise, and precise	NTT02; TT01; TT02
Build the picture from A to B to C to D and not go from A to D and then fill in the Bs and Cs.	NTT02
Condense information	NTT01; TT02
Critically analyze, answer, and convey information, problems, and questions	TT01; NTT01
Determine a story and how it relates to an audience	NTT03
Document thought and report the basics	NTT02; TT01; TT02
Find balance between making the article personal and using only other people's thoughts	TT01
Find, understand, and incorporate credible sources and research	TT01
Make correct judgment and inferences about the data	NTT02
Manage time, use resources, and find support and answers	TT01
Organize thoughts and do not regurgitate words on paper	TT01
Process information while determining the most important information and transferring that information into a story)	NTT03
Say things in as few words as possible	TT01
Say what they intend to say and avoid noise	TT03
Think through and plan arguments and responses in a clear way	NTT03; TT01
Understand discipline specific terminology	NTT02
Understand grammar, mechanics, and punctuation (e.g., spelling, parts of speech, sentence structure, organize paragraphs, comma and apostrophe usage, noun and its pronoun antecedent)	TT01; NTT02; NTT03
Understand the big picture	NTT02
Use evidence to objectively explain information	*NTT02; TT01; TT02*

Teaching Writing

Because teaching students to become effective writers is not about a single activity, teaching technique, or assignment, writing-intensive courses should include various types of assignments, resources, reflection and instruction (NTT05). In addition to activities, techniques and assignments, instructors can help students become effective writers through motivation and guidance (NTT02). Instructors can motivate students to "see a different angle [by] gradually giving students a little bit until they have the whole thing" (NTT02).

Applied writing assignments are effective ways to teach writing (TT01). Writing taught through application helps students understand the process of producing a typical document in their field and the reflection helps them analyze the product and process retrospectively (TT01). Students in one course research an organization and write about a specific topic related to the organization's needs (TT01). Much of the research involved with the project includes reading about and understanding the organization. Reading is important to becoming an effective writer (TT01; NTT03) because students can develop more effective content when they read information and material related to what they are writing. More reading should be required in writing-intensive courses because it forces students to read the writing style they are expected to write (NTT03).

One non-tenure track faculty member designs assignments that help students understand structure, organization and writing for a specific audience (NTT01). He said he focuses on teaching students how to write and define a major point before teaching them how to develop and understand paragraphs and sections of the document. For example, "introduction is the roadmap paragraph of exactly what you are going to say. It just gives clarity to the paper" (NTT01). So, if the introduction is not clear and it does not establish a foundation for the document, then the introduction is weak (NTT01).

Thus, teaching a one-hour course that introduces students to specific writing styles, document sections and formats would help students become effective writers (NTT01). The course content should be taught using a guest lecture series format in a 14-week semester and should provide students with guidance in style, citations, etc. and explain writing components and subcomponents. Also, providing students with basic grammar sheets (NTT03) and reviewing expectations and tips related to writing at the beginning of the semester (TT01) can help students improve their writing ability. Students must know how to critically analyze information, but that can be taught (NTT01). They "do not like to write because they do not know how to use English properly" (NTT01). Students' writing is a basic, fundamental type problem that could be addressed by requiring two English courses or implementing a one-hour fundamental course (NTT01).

In addition to writing instruction, all three of the departments offered students resources to become more effective writers. One department has a writing lab that provides students support in developing course assignments and learning the fundamentals of writing (NTT01). One faculty member (NTT03) used Purdue Owl, an online resource that helps students properly use APA style and provides clear, concise examples of proper grammar. A tenure-track faculty member (TT01) provides students with examples of effective documents and leaves gaps to let them think about how to do things, which makes them come to office hours for feedback and help. Whereas, another tenure-track faculty member (TT03) provides students with experience in, resources about and instruction on peer and self-evaluation but focuses on teaching them how to have others edit an assignment before turning it in.

Writing Factors

Three writing factors that augment critical thinking and create knowledge emerged as part of the study. Faculty believed that presenting and defending a topic to a variety of public audiences, writing repetitively and receiving rich, timely feedback were instrumental in students' ability to think critically and create knowledge.

Students need to have the ability to present and defend a topic to a variety of public audiences in a succinct way (NTT01; NTT02; TT01; TT02). Writing is explaining (NTT01) and "summary is a gift upon itself" (NTT02). Traditionally, students write for an audience of one–their instructor. However, learning to write for an audience larger than one faculty member is important (NTT02). Students need to know "how important their writing can be to someone they do not even know is reading it" (NTT02). In the same way, students need "to put themselves in the shoes of the reader" (TT03) to realize the ramifications of the things they write (NTT02).

Writing for one group can be easy, but interpreting the same information for three or four different groups is more challenging (NTT01). When students present information to public audiences, they learn to make arguments based on an understanding of all sides of the situation (NTT02), express themselves and their opinion and support their opinion with facts and evidence (TT01). Obtaining written feedback from students is one way for instructors to understand students' comprehension of a subject matter and document students' success (TT02).

Second, writing repetition is important in students' ability to become critical thinkers and knowledge creators (NTT01; NTT02; NTT03; NTT04; NTT05; TT02; TT03). Writing should be constant in a writing-intensive course (NTT04). It should include opportunities to use a variety of writing scenarios (NTT04) and produce multiple writing drafts and assignments (NTT05). Students should write at least once a week while completing other writing assignments (NTT03). The more opportunities students have to write and be critiqued by their instructors, the more effective writers they will become (NTT01; NTT04). "The more papers you write, the better you get at it" (NTT01), which was reiterated by another faculty member (NTT03) with the "*best way for students*

to become better writers is to write more; it takes doing it over and over again so it becomes second nature."

Third, faculty should provide students with rich, timely feedback. Indeed, small class sizes provide faculty with an environment that fosters more individualized feedback because it helps faculty build stronger, more helping relationships with their students (TT01). Feedback should be constant and timely (NTT03; TT03) because of its importance in the writing process (NTT01; NTT03; NTT05; TT01; TT02). "Constant writing and constant feedback—every assignment should be graded and explained heavily" (NTT03). The amount of time spent writing improves student writing only if there is feedback because, without feedback, students make the same mistakes again and again (NTT05).

Rich feedback should be given through constructive criticism on what students are doing wrong (e.g., grammar, APA style), rewrite options and recommendations from instructors and peers on how to become more effective writers (NTT05; TT01; TT02; TT03). Students need to learn how to provide constructive feedback because, as managers, they will be required to provide feedback to their subordinates (TT02). When students have the opportunity to rewrite an assignment, they should be required to do more than just rewrite the assignment (NTT01). Telling students they can revise can be dangerous because they can turn anything in and fix it later (TT02). "I don't want them to just rewrite and make corrections. I want them to think a little bit" (NTT01). Therefore, "do not tell them what to fix. Just tell them it needs fixed" (TT03). Reviewing, then, should help students learn not only how to provide feedback but also how to understand and revise based on feedback (TT02).

Additionally, to improve the feedback process, faculty should assign students small writing tasks that build on each other because they can provide more focused feedback throughout the process. Assignments should be like a scaffold–small assignments that culminate into larger assignments (NTT01; TT01). The small assignments help students break up the project into manageable pieces and give them opportunity to set and work toward the goal of a large project. "Biting off chunks and getting feedback on those chunks as they go" (TT01) is an important part of putting together a higher quality final product.

Discussion

Faculty members who teach writing-intensive courses in the social sciences of agriculture defined writing using four themes–writing in agriculture, characteristics of effective writers, teaching writing and writing factors. Faculty reiterated that students should learn to write because employers expect college graduates to be effective communicators. However, students' first negative impression in business is often their inability to communicate with both external and internal audiences.

Writing is important in the social sciences of agriculture because it is an indicator of how people think. It is a method of reflection, knowledge telling, assessment and evaluation, which was evidenced in the literature (Bereiter and Scardamalia, 1987; National Council of Teachers of English, 2009; Strachan, 2008). One faculty member (TT01) described writing as a "window to the brain in terms of how people think, how they make and support arguments and how they solve problems and use resources," which is a strong, yet, true statement that reflects the importance of students learning how to use writing to think critically.

Teaching strategies and techniques can influence the development of critical thinking skills as they relate to writing. Writing, when embedded into a course, can help students understand course material, which was also discussed by Aaron (1996). However, students often rush through writing tasks and do not take time to develop, revise, rewrite and edit. They are quick to mark a task off of the list and move on to the next assignment (TT03). Perhaps, writing instructors should spend more time linking writing to learning at the beginning of class, explaining how writing can help students learn more about their disciplines and discussing how to transfer writing skills from one class to another. Additionally, instructors could implement reading assignments to help students understand the real-world application of writing as well as the language (Strachan, 2008) of their discipline.

Furthermore, faculty described three important writing factors that augment critical thinking and create knowledge–presenting and defending a topic to a variety of public audiences, writing repetitively and receiving rich, timely feedback. The ability to present and defend a topic to a variety of public audiences is important because, to sufficiently present information for retention, students must possess an adequate understanding of the information themselves. They must be well-researched and have the ability to find credible information (TT01). Knowing an audience requires research and the ability to ask the right questions about an audience. However, students often fail to spend the time to understand their audience, which is important in becoming an effective writer and in building a foundation for success in discipline-specific courses.

Students often write for one audience–their instructor–but they need to learn to write for a broader audience, which was evidenced in the literature (Aaron, 1996; Bereiter and Scardamalia, 1987; Walker, 2011). If students are not expected to defend their argument to a larger audience, they will never move from knowledge telling to knowledge transforming, as Bereiter and Scardamalia described in 1987. Students need to reach the knowledge transforming level of writing development, but they must have opportunity to present and defend what they know.

Also, faculty emphasized that students should be provided with opportunities for writing repetition because writing becomes easier and students become more effective writers with more writing opportunities. The amount of time spent writing increases students' ability to

write, which Orr (1996) and Walker (2011) found as well. According to Vanderburg (2006), students must spend time writing, which is one of the hardest parts about writing instruction. Although writing in the classroom is tedious, time consuming work, it is one of the only ways students will become effective writers (NTT03; NTT04; NTT05). Students cannot become effective writers by producing one to two writing assignments during a semester.

Repetition alone, though, does not improve students' writing abilities because students must also receive rich, timely feedback. Although faculty in this study encouraged rich, timely feedback, it is a highly debated topic because of the need for faculty time and commitment, an evident point in Cobia's 1986 study. Constant feedback, however, does help students become effective writers, which Bok found in 2006. If faculty can provide students with feedback on small assignments that build into larger assignments, it is likely that faculty will not have to spend as much time grading large assignments at the end of the semester. The building process can help students clarify their projects and understand how to take a complex project from start to finish (TT01), which provides them with a snapshot of a real-world project that they might encounter as a professional.

Rich feedback, however, is not simply making a few comments on an assignment–it is providing students with specific resources to improve their writing and making them aware of their mistakes (NTT05; TT01; TT02; TT03). For example, if a student has a misplaced modifier, the instructor should not correct the sentence for him or her. The instructor should tell the student he or she has a misplaced modifier in the specific sentence and provide a resource for the student to use as a guide. Additionally, telling students that they will have the opportunity to rewrite their assignment could cause issues because the student may not take the assignment as seriously the first time (TT02).

Recommendations for Research

Just as Vanderburg (2006) postulated, more research needs to be conducted on the methods of helping students become more effective writers. Although certain themes emerged that are important in using writing to enhance critical thinking, more research needs to be conducted on each one of the writing factors to determine at what level they impact critical thinking and knowledge creation, if in fact they do at all.

Furthermore, it is important to determine the effects of having multiple points of feedback and the level of feedback that works best in the classroom. Future research could be conducted on the best types of feedback and ways to provide feedback. Furthermore, similar studies should be conducted in other social science departments across the country as well as in bench science departments at Texas A&M University. Replicating this study in other settings is important because the results of this study cannot be generalized beyond the population.

Recommendations for Practice

Writing instructors can modify their curriculum to include writing factors and teaching techniques that contribute to students' development as critical thinkers and knowledge creators. For example, if faculty know that writing repetition with multiple points of feedback improves students' ability to think critically and write effectively, they can adapt the course schedule to include points of individual and group contact.

Establishing a baseline of students' understanding of writing mechanics expected in their specific disciplines would help students further understand their discipline and the instructor's expectations. Further, to combat the issue of understanding typical and atypical audiences within the disciplines, faculty should spend at least one class period during a semester discussing audience for that specific discipline and how to identify and target the discipline's audiences. As a final point, faculty should be open to trying new ways to teach writing and have a willingness to conduct research in their courses.

Summary

This study provides a foundation of research that can be implemented in the classroom or be used to develop larger, more complex research projects. Understanding how students become effective writers and what writing factors contribute to their writing development would provide administrators and faculty with an in-depth description of how to make writing instruction more effective. Exploring different points of view will develop a strong foundation and baseline of what writing instruction should include for retention and transfer of knowledge in the social sciences of agriculture. In the end, students should not be educated in the separate institutions of agriculture and writing. They should be educated in agriculture and writing simultaneously. "It takes a campus to teach a writer" (Maimon, 2012, p. 97).

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Collaborative Analysis and Revision of Learning Objectives

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Abstract

The purpose of this study was to report on the employment of Bloom's revised taxonomy as a means to describe, assess and revise the learning objectives postsecondary instructors operationalized in their classroom and laboratory instruction. The study uses an example case to describe a generalizable process for assessing learning objectives instructors use within classroom instruction. The example case illustrates that 74% of the specified learning objectives utilized in classroom instruction by 26 instructors were characterized as addressing primarily lower order cognitive processes. The described method of assessing learning objectives is intended to assist instructors in two ways: 1) To help them gain a deeper understanding of the learning objectives they are employing and 2) To provide guidance for constructing and revising learning objectives so that they require higher order levels of cognition from students.

Introduction

Postsecondary students entering the workforce face many challenges in finding pathways to success (Alfeld et al., 2006). The prosperity of entry level professionals in the global market will erode unless educational systems can assist students in developing valued knowledge and skills along with a deep capacity to learn, solve problems and adapt to novel work and entrepreneurial environments. However, in order for students to achieve great heights, they must first be able to master foundational academic content which requires multiple levels of cognitive processing and utilizes a range of knowledge dimensions (Archambault, 1964; Knobloch, 2003).

The process of engaging students in meaningful high utility learning opportunities should begin with a clear specification of educational goals and objectives (Hoachlander, 1999). Explicitly aligning learning activities with well written goals and objectives will help to ensure that learning activities and assessments are focused and germane to the academic and career challenges students will face in the future (Blumberg, 2009). Moreover, if instructional goals and objectives are structured and organized appropriately, learning activities are contextualized and will support the acquisition of a range of knowledge types which include a variety of cognitive processing levels (Blumberg, 2009).

Bloom's revised taxonomy (Anderson et al., 2001), is a refinement and extension of original work by Benjamin Bloom (1956). Bloom's original work is an often cited and utilized tool for classifying educational objectives based on what instructors expect their students to learn and be able to do (Fink, 2003). Bloom's revised taxonomy was constructed by one of his protégés and several colleagues. The revised taxonomy is considered to be an effective tool for writing, organizing and analyzing learning goals and objectives (Blumberg, 2009). Bloom's revised taxonomy (Anderson et al., 2001) allows researchers and educators to conceptually chunk large amounts of complex information in order to bring more precision to applied practice. One of the critical strengths of the revised taxonomy is that it can be employed as a syntactic logic tool at the macro level for curriculum planning and program assessment and at the micro level for lesson planning and student assessment (Cannon and Feinstein, 2005).

In the revised taxonomy, learning objectives can be described and represented using a two-dimensional taxonomic table (Anderson et al., 2001). Table 1 illustrates the four dimensions or types of knowledge that are categorized on the vertical axis within the two-dimensional taxonomic table of the revised taxonomy and Table 2 illustrates the six levels of cognitive processing that are illustrated on the horizontal access of the table. The intersection of the four categories of the knowledge dimension and six categories of the cognitive process dimension form twenty-four discrete cells which afford educators the opportunity to more precisely classify learning objectives based upon the specific facets of the intersecting dimensions. (Krathwohl, 2002).

Table 1 demonstrates that within Bloom's revised taxonomy (Anderson et al., 2001) the four types of knowledge are: a) factual; b) conceptual; c) procedural; and d) metacognitive. Factual knowledge is considered to be knowledge of terminology, facts and basic elements of more complex knowledge, e.g., people,

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Table 1. The Structure of the Knowledge Dimension of Bloom's Revised Taxonomy

A. Factual knowledge: The basic elements students must know to be acquainted with a discipline or solve problems within it.
Aa. The knowledge of terminology
Ab. The knowledge of specific details and elements
B. Conceptual knowledge: The interrelationship among the basic elements within a larger structure that enable them to function together.
Ba. Knowledge of classifications and categories
Bb. Knowledge of principles and generalizations
Bc. Knowledge of theories, models, and structures
C. Procedural knowledge: How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.
Ca. Knowledge of subject-specific skills and algorithms
Cb. Knowledge of subject-specific techniques and methods
Cc. Knowledge of criteria for determining when to use appropriate procedures
D. Metacognitive knowledge: Knowledge of cognition in general as well as awareness and knowledge of one's own cognition.
Da. Strategic knowledge
Db. Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge
Dc. Self-knowledge

Note. Adapted from Anderson, et al. (2001). p. 29.

events, locations, or dates (Anderson et al., 2001). Conceptual knowledge reflects a deeper understanding of content and how it is connected to larger systematic perspectives (Blumberg, 2009). Procedural knowledge often involves processes or methods and the criteria utilized to make decisions regarding key steps and procedures (Anderson et al., 2001) Metacognitive knowledge involves being self-aware of personal cognitive strengths and challenges. Metacognitive knowledge is also related to knowledge of general strategies for learning and knowledge about how, when and why to employ particular learning strategies (Blumberg, 2009).

Table 2 illustrates that within Bloom's revised taxonomy (Anderson et al., 2001) the six levels of cognitive processing form a hierarchy based upon differences in complexity and range from least complex to most complex: 1) remember; 2) understand; 3) apply; 4) analyze; 5) evaluate; and 6) create (Anderson et al., 2001). The revised taxonomy lists additional verbs within each of the six levels which more clearly delineate their nature. For example, level two titled understand, includes more measureable verbs such as interpret, classify and compare. In particular, it is the measureable verbs that more precisely characterize the breadth and depth of each of the cognitive process levels.

Methodology

The purpose of this study was to report on the employment of Bloom's revised taxonomy as a means to describe, assess and revise the learning objectives postsecondary instructors operationalized in their classroom and laboratory instruction. The target population for the study was 26 postsecondary instructors working within a university system in a North Eastern state that took part in a two day institute. The participants of the study worked in range of 2-year and 4-year institutions and specialized in a variety of science based fields of study. The State University of New York at Oswego Human Subjects Committee approved the study protocol and all participants provided written informed consent prior to their participation in the study.

Institute participants were organized into cooperative learning groups of three to four people and assigned several goal oriented tasks. The first tasks included each instructor describing to the rest of their cooperative learning group the scope and sequence of the learning objectives they utilized within one of their courses of study. The second layer of tasks involved the cooperative groups employing Bloom's revised taxonomy to collaboratively analyze the learning objectives each individual instructor utilized within the course they had previously described. The third layer of tasks directed the cooperative groups to organize and analyze the learning objective data to look for trends and interesting bits of information. The fourth layer of tasks included the cooperative groups working collaboratively to adapt and revise each individual instructor's learning objectives in order to: a) structure a better sequencing of topics; b) promote higher levels of student cognition; and c) effectively align learning objectives with pertinent departmental and campus priorities and assessment strategies. The fifth layer of tasks asked the instructors to utilize Bloom's revised taxonomy to collaboratively reanalyze the learning objectives of each individual again to assess the level of change that occurred throughout the process.

The second and fifth layer of tasks which involved the cooperative groups utilizing Bloom's revised taxonomy to analyze their learning objectives merit a closer examination. The members of the cooperative groups first individually reviewed their collaborators' learning objectives. The individual reviews allowed for overlap and a check of inter-coder reliability. Table 3 illustrates the taxonomic

Table 2. The Structure of the Cognitive Process Dimension of Bloom's Revised Taxonomy

1.0 Remember: Retrieving relevant knowledge from long-term memory.
1.1 Recognizing, identifying
1.2 Recalling, retrieving
2.0 Understand: Constructing meaning from instructional messages including oral, written, and graphic communication.
2.1 Paraphrasing, translating
2.2 Interpreting, illustrating, instantiating
2.3 Classifying, categorizing, subsuming
2.4 Summarizing, abstracting, generalizing
2.5 Inferring, concluding, extrapolating
2.6 Comparing, contrasting, matching
2.7 Explaining, constructing models
3.0 Apply: Carrying out or using a procedure in a given situation.
3.1 Executing, performing
3.2 Implementing, carrying out
4.0 Analyze: Breaking material into its constituent parts and determining how the parts relate to one another and to an overall structure or purpose.
4.1 Differentiating, discriminating, distinguishing
4.2 Organizing, integrating, structuring
4.3 Attributing, deconstructing
5.0 Evaluate: Making judgments based on criteria and standards.
5.1 Checking, detecting, monitoring, testing
5.2 Critiquing, judging
6.0 Create: Putting elements together to form a novel, coherent or functional whole; reorganizing elements into a new pattern or structure.
6.1 Generating, hypothesizing
6.2 Planning, designing
6.3 Producing, constructing

Note. Adapted from Anderson, Krathwohl, et al. 2001. p. 67-68.

table that the instructors used, in conjunction with the information reflected in Tables 1 and 2, to classify the learning objectives provided by each instructor. One of the central strengths of the taxonomic table is that it provides a framework for describing learning objectives by the type of knowledge to be gained and the cognitive process employed to facilitate the actual learning. Classifying each instructor's learning objectives using the taxonomic table provided a visual map that the cooperative groups could use to assess the arrangement and effectiveness of their learning objectives.

In order to use Bloom's revised Taxonomy it is necessary to understand that any individual learning objective will fall under one of the six discrete categories of cognitive processing and at the same time will also be linked to one of the four discrete categories of knowledge dimension. The object in a learning objective statement is used to determine whether the learning objective is supporting factual, conceptual, procedural, or meta-cognitive knowledge acquisition. The verb in a learning objective statement is used to determine which cognitive process dimension is being applied in the learning process: remembering, understanding, applying, analyzing, evaluating, or creating.

Once the knowledge and cognitive process dimensions are determined, learning objectives can be correctly placed in the taxonomic table. Learning objectives placed in the upper left hand corner of the taxonomic table tend to be more concrete, simple, structured and require less learner independence. And as the taxonomic niches traverse the table diagonally toward the lower right hand corner the learning objectives tend to be more abstract, complex, open, multifaceted and require greater learner independence. Table 4 provides a conceptual illustration which depicts the increasing relative complexity of the learning objectives niches as they traverse the table from the upper left to the lower right hand corner. Complexity is not only increased by the number of elements which must be cognitively processed, but also the connections between those elements.

It may be beneficial to provide several examples in order to more clearly delineate the process enacted by the instructors to classify each of the learning objectives. To that end, Table 5 illustrates three example learning objectives that were classified within the process of the research study. For brevity only the essential elements of the example objectives are presented.

Table 5 illustrates that the object in learning objective one was as follows: the 16 essential elements all plants need for life, growth and reproduction. Learning objective one required learners to demonstrate a type of knowledge that represents a basic building block which would be utilized in the construction of different types of knowledge. More specifically the object of the learning objective sentence required students to demonstrate knowledge of technical vocabulary, a type of factual knowledge. Therefore, learning objective one was classified as being within the factual knowledge category of the knowledge dimension of Bloom's revised taxonomy.

Table 5 demonstrates that the verb in learning objective one required learners to identify information. In this case, to identify the required information depends only on the learners' ability to recognize or recall, therefore, learning objective one was classified as being within the remember category of the cognitive process dimension of Bloom's revised taxonomy. Once both dimensions of a learning objective have been classified it can be placed into one of the 24 cells created by the intersection of the knowledge and cognitive process dimensions of the taxonomic table illustrated in Table 3. Using Table 3 as a guide, objective one would most appropriately be placed in cell A1 at the upper left hand corner of the taxonomic table.

Table 5 illustrates that the object in learning objective three was as follows: the efficacy of an algorithm based on real-time data. The object of the learning objective sentence required students to demonstrate knowledge of subject specific techniques, as well as, knowledge of criteria for determining when to use appropriate procedures. Therefore, learning objective three was classified as being within the procedural knowledge category of the knowledge dimension of Bloom's revised taxonomy.

Table 5 demonstrates that the verb in learning objective three required learners to evaluate situations based upon data. In order to demonstrate the ability to complete the required evaluations learners must be able to enact appropriate interpretation and appraisal techniques that lead to accurate judgments. Therefore, learning objec-

Table 3. A two-dimensional illustration of the relationship between the knowledge and cognitive processing dimensions of Bloom's revised taxonomy

	Cognitive Process Dimension					
Knowledge Dimension	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual	A1	A2	A3	A4	A5	A6
Conceptual	B1	B2	B3	B4	B5	B6
Procedural	C1	C2	C3	C4	C5	C6
Metacognitive	D1	D2	D3	D4	D5	D6

Note. Adapted from Krathwohl, 2002. p. 216.

Table 4. A two-dimensional conceptual illustration of the complexity of the cognitive process dimension increases from left to right

	Cognitive Process Dimension					
Knowledge Dimension	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual						
Conceptual						
Procedural						
Metacognitive						

Note. Adapted from Krathwohl, 2002. p. 216.

Table 5. Example learning objective statements and their classifications

	Learning Objective Statement	Classification
1	Identify the 16 essential elements all plants need for life, growth, and reproduction	A1
2	Analyze the relationship between the design of a technology and its impact on the surrounding systems	B4
3	Evaluate the efficacy of an algorithm based on real-time data analysis procedures	C5

Table 6. A classification of the learning objectives instructors operationalize in their classroom

	Cognitive Process Dimension					
Knowledge Dimension	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual	[1]28	13	10	14	2	*
Conceptual	6	3	4	8	*	*
Procedural	4	3	2	*	*	+
Metacognitive	+	+	+	+	+	+

Note. [1] Percent of the overall total number of objectives in classification rounded to the nearest whole number. * The percent of the overall total number of objectives is equal to less than 0.50. + No objectives in classification.

Table 7. A classification of the revised and adapted learning objectives

	Cognitive Process Dimension					
Knowledge Dimension	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual	[1]7	5	8	7	8	6
Conceptual	5	4	4	5	3	6
Procedural	3	5	2	7	5	5
Metacognitive	+	+	1	2	2	+

Note. [1] Percent of the overall total number of objectives in classification rounded to the nearest whole number. * The percent of the overall total number of objectives is equal to less than 0.50. + No objectives in classification.

tive three was classified as being within the evaluate category of the cognitive process dimension of Bloom's revised taxonomy. Utilizing Table 3 as a guide, objective three would most appropriately be placed in cell C5 at the lower right hand corner of the taxonomic table.

In the example study a percent agreement method was employed as a means of estimating inter-coder reliability. The ratings of each individual instructor were compared to the ratings of each other individual instructor within their cooperative group, all of the inter-coder reliability estimates were found to be equal to or greater than 0.97 (Perhaps include the name of procedure used, e.g. Cohen's kappa). In cases where discrepancies were noted, the classifications were determined by consensus discussion.

Results/Findings

The purpose of this study was to report on the employment of Bloom's revised taxonomy as a means to describe, assess and revise the learning objectives instructors operationalized in their classroom instruction. The 26 instructors participating in the example study had an average of 218 (SD= 29.2) students per year and taught an average of 4.8 classes (SD=1.1) a year. A slight majority of the instructors were male (62%) and (70%) of the instructors had a doctoral degree.

The current study used Bloom's revised taxonomy (Anderson et al., 2001) as part of a method for describing and assessing the learning objectives postsecondary instructors use within classroom and laboratory instruction by knowledge dimension and cognitive process simultaneously. Table 6 provides a summary of the data associated with carrying out the assessment of the learning objectives and an illustration of Bloom's revised two-dimensional taxonomy. Table 6 also provides an overarching perspective regarding the types of learning objectives the instructors have implemented in their classroom instruction.

Table 6 reveals that very few of the learning objectives reviewed were designed to support abstract, complex, open, or multifaceted learning opportunities that require greater learner independence and higher levels of cognitive processing. Table 6 also demonstrates that a substantial majority (74%) of the learning objectives described and assessed were designed to elicit lower order cognitive processes and 71% of those objectives were characterized as addressing lower order cognitive processes focused only on the factual category of knowledge. The information presented in Table 6 demonstrates that there were slightly more learning objectives classified as conceptual then there were objectives classified as procedural within the knowledge dimension of Bloom's revised taxonomy. That indicates that the instructors placed some emphasis on both conceptual understanding and actually executing appropriate techniques and procedures using learned skills.

Part of the generalizable process delineated in the current study included the cooperative groups of instructors collaborating to revise the learning objectives they had initially described and assessed. [My preference is to state that the data in a particular table illustrates or indicates, not the table itself] Table 7 illustrates the information that resulted from the revision and reassessment of the original learning objectives the cooperative groups of instructors started with at the beginning of the process. Table 7 reveals that the revision process resulted in a more even distribution of level learning objectives across a range of cognitive process and knowledge dimensions.

Data presented in Table 7 delineates that after the collaborative revision process only 44% of learning objectives described and assessed were designed to elicit lower order cognitive processes and only 45% of those objectives were characterized as addressing lower order cognitive processes focused within the factual category of knowledge. Table 7 illustrates that the cooperative revision process lead to an increase in the number of learning objectives that emphasized conceptual and procedural dimensions of knowledge at higher cognitive processing levels. Table 7 also reveals that the cooperative revision process assisted instructors to adapt existing or create new learning objectives that were classified as being within the metacognitive knowledge dimension category. Metacognitive objectives refer to students' awareness of their own knowledge and ability to understand and manipulate their own learning processes. Objectives in this category most frequently required students monitor their degree of understanding or reflect on their problem solving strategies or outputs.

Conclusions/Implications/Recommendations

The purpose of this study was to report on the employment of Bloom's revised taxonomy as a means to describe, assess and revise the learning objectives instructors operationalized in their classroom and

laboratory instruction. The study used a generalizable example to illustrate the processes and included the data that resulted from enacting the process with 26 instructors. The central conclusion of this research was that the generalizable process was an effective means of assisting the instructors to create a greater diversity of learning objectives that addressed a wider range of cognitive process and knowledge dimensions. Further the cooperative process effectively helped instructors to create higher order learning objectives that went well beyond the simple memorization of facts. Meaning is added to this finding when attention is given to the idea implicit within higher order learning objectives is the requirement to remember and understand: a) factual; b) conceptual; and c) procedural knowledge.

Employing Bloom's revised taxonomy and particularly the taxonomic table was an effective method for assisting instructors to create a visual representation of the learning objectives they employed within their teaching. It was also a useful way to help them think about revising the learning objectives they used in order to create learning opportunities that required more abstract, complex, open, multifaceted and independent cognitive operations. In addition, the employment of the cooperative groups assisted the instructors in: a) initially describing and assessing their learning objectives; b) revising and adapting their learning objectives; and c) reassessing their learning objectives. In an age of increasing accountability, it is useful to have such a simple and effective means of illustrating the rigor of the learning objectives that are being operationalized in classrooms and laboratories.

It is recommended that instructor development professionals and providers of professional development use the generalizable process described in this study to assist instructors to carefully design or revise their instructional objectives. Instructor development professionals and providers of professional development may also want to consider implementing instruction for instructors that emphasizes the importance of using frameworks, such as, Bloom's revised taxonomy to construct and organize student learning opportunities. An emphasis should be placed on creating and utilizing learning opportunities that pass beyond rote memorization and move students towards learning how to address novel challenges and developing as self-aware innovators.

It is suggested that instructors examine the course, unit and lesson level learning objectives they utilize to make sure they address a range of knowledge and cognitive processing categories. It is recommended that instructors seek professional development opportunities to extend their content and pedagogical related knowledge and expertise so that they may expand their teaching repertoire. It is also recommended that instructors connect with other instructors to explore collaborative methods for developing and revising learning objectives.

Further research on the employment of cooperative groups to strengthen the professional practice of individual instructors is warranted. Cooperative learning as a method of instruction has demonstrated robust efficacy across a range of ages and cultural contexts, it is likely that it would be well suited for instructor professional development (Johnson and Johnson, 2009).

More specifically, it is recommended that research be carried out to create information about how instructors could best utilize the process describe in this study with colleagues or cooperative groups within their own institution. To extend knowledge in a slightly different direction research could be carried out to analyze whether the knowledge and cognitive processing classification dimensions of learning objectives correlate with the enactment of appropriate research based teaching and assessment methods. Based on the very low percentage of metacognitive learning objectives it is also recommended that further research examine instructors' awareness and perception of metacognition as an element of learning and as a dimension within Bloom's revised taxonomy.

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Understanding Students' Experiences in Writing-Intensive Courses

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Abstract

Students' ability to be effective writers is paramount to their success in the workforce. The purpose of this qualitative study was to use focus group interviews to understand students' experiences in and attitudes about writing-intensive courses in two social science departments in the College of Agriculture and Life Sciences at Texas A&M University. Fifteen students from the Departments of Agricultural Economics and Agricultural Leadership, Education and Communications participated in three focus groups. All participants had taken at least one writing-intensive course. Four prominent themes emerged: definition of writing, writing instruction, critical thinking and learning and writing-intensive course experience. Students claimed not all writing-intensive courses are effective. However, courses that provided students with opportunities to immerse themselves into a writing-rich environment while learning effective ways to portray thoughts, acquire the diction of the discipline, overlook superfluous information and be specific were effective. Courses with repetitious, project building assignments and feedback at regular intervals helped students become effective writers. Improving students' writing abilities is more than just stating criteria and implementing the criteria in the course. More research needs to be conducted on the teaching methods and writing assignment that help students become effective writers who can analyze information and think critically.

Introduction

Effective writing is paramount to students' success in their personal and professional lives (Motavalli et al., 2003; Reynolds, 2010; Strachan, 2008; Zhu, 2004). Students use writing as a process to discover, develop and disseminate scientific information and ideas (Foster, 1983). It "promotes discovery of linkages among existing ideas, the reshaping and reorganization of old ideas and the creation of new ones" (Ryan and Campa, 2000, p. 175). However, students often times find ways to avoid writing because of the difficulties and struggles that accompany the process (Davies and Birbili, 2000).

In an Australian bachelor of agricultural science program, students reported they were concerned about paper structure, finding information and reactions of their audience but had specific issues with thinking critically while they write (e.g, making arguments, reviewing and describing all sides of an issues and critically reviewing information; Tapper, 2004). In contrast, Huang (2010) wrote that students believed their writing issues were more surface-level (e.g., sentence structure and organization) than discourse-level emphasizing their continued need for support and instruction in those areas. Further, Bok (2006) indicated that improving students' writing would require student/faculty interaction with one-on-time devoted to helping students develop fundamentals and address specific issues, more frequent writing assignments and in-depth feedback from faculty.

In the theory of education and identity, Chickering and Reisser (1993) explained that undergraduate students develop intellectual and interpersonal competence related to written communication during college. Pascarella and Terenzini, in 1991, found that students increase their intellectual ability to more effectively communicate (oral and written) by an average of 19 percentile points during college. Intellectual competence, as defined by Evans et al. (2010), is the "acquisition of knowledge and skills related to particular subject matter" (p. 67). Chickering and Reisser (1993) contended that for students to analyze a situation they need to learn more about the subject area because, as Epstein (1999) explained, students' ability to master, understand and engage with a topic in their written work reflects their subject knowledge.

Likewise, Foster (1983) described writing as a critical element in students' self-discovery, self-development and social maturation. Students actively develop their ideas, questions and opinions while critically observing

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and reflecting on their own thinking (Chickering and Reisser, 1993). Students' ability to understand new information and communicate it effectively is critical to developing intellectual competence (Chickering and Reisser, 1993). As students become more intellectually competent, they engage with the course material, are able to see both sides of a situation and make adequate conclusions based on their observation and analysis (Chickering and Reisser, 1993).

Additionally, students develop interpersonal competence as they learn to effectively communicate and collaborate with others (Chickering and Reisser, 1993; Evans et al., 2010). Chickering and Reisser (1993) and Klemp (1977) stated that interpersonal skills are paramount to students' success in personal and professional relationships. Students who have developed interpersonal competence have an increased ability to listen to others, ask questions, contribute to conversation without misleading the group and effectively facilitate group dialogue (Chickering and Reisser, 1993). Moreover, students are interpersonally competent when they can choose the correct timing, medium, audience, content and source to achieve specific communication goals in both their personal and professional lives (Breen et al., 1977).

Therefore, the purpose of this qualitative study was to use focus group interviews to understand students' experiences in and attitudes about writing-intensive courses in two social science departments in the College of Agriculture and Life Sciences at Texas A&M University. Three research questions guided this study:

1. How do students define writing?
2. What are students' experiences in writing-intensive courses?
3. What writing factors help student writers become more effective?

Method

Texas A&M University's more than 45,000 undergraduate students are required to take one writing-intensive (W) course (focused on written communication) and one communications-intensive (C) course (focused on oral communication), or two writing-intensive courses as part of the Communications-in-the-Disciplines program. Courses, however, may be taught by teachers who are not trained to teach written communication. W courses were implemented for students to learn how to communicate in written form using practical writing assignments representative of the types of writing they may do in the workforce. Students should use the skills they gain in writing-intensive courses to solve problems and communicate more effectively and efficiently about their disciplines (Texas A&M University Writing Center, 2014). Course criteria includes providing writing assignments related to students' majors, integrating instruction and feedback that gives students the opportunity to improve their writing assignments and requiring students to write a minimum of 2000 words. Writing should be used as a method of learning course content and inspiring students to be creative, use critical thinking skills and take ownership of their writing (Texas A&M University Writing Center, 2014).

Qualitative focus group interviews were used in this study as a nondirective form of interviewing that redirects the attention to the respondent (Krueger and Casey, 2000). Focus groups "reveal aspects of experiences and perspectives that would be not as accessible without group interaction" (Morgan, 1997, p. 20). In focus groups, participants may more openly share their opinions, thoughts and experiences because the group participation allows for more natural conversation and interaction (Myers et al., 2011).

The students (Table 1) recruited for this study were majoring in agricultural business, agricultural economics, agricultural leadership and development and agricultural science in the College of Agriculture and Life Sciences at Texas A&M University. The population was limited to the social sciences, defined as institutions and functions of human society and relationships, within agriculture because of the broad scientific disciplines and the variety of writing contexts in agriculture. Each student had completed at least one undergraduate writing-intensive course at Texas A&M University at data collection, January 2013. Agricultural communication and journalism students, though, did not participate in the study because writing is the core component of their program of study.

Table 1. Student Demographics and Writing Intensive Courses Taken

	Focus Group One *(n = 6)*	Focus GroupTwo *(n = 6)*	Focus Group Three *(n = 3)*	Total *(N = 15)*
Gender				
Male	2	5	3	10
Female	4	1	0	5
Major[1]				
Agricultural Business	2	1	0	3
Agricultural Economics	0	2	0	2
Agricultural Leadership and Development	4	3	1	8
Agricultural Science	0	1	2	3
Expected Graduation				
2012	0	0	2	2
2013	5	5	1	11
2014	1	1	0	2
Courses Taken				
Agricultural Policy	2	4	0	6
Clinical Professional Experience in Agricultural Science	0	0	2	2
Designing Instruction for Secondary Agricultural Science Programs	0	0	2	2
Fundamentals of Agricultural Economics Analysis	1	4	0	5
Leading Change	3	3	1	7
Survey of Leadership Theory	4	1	1	6

[1] One student was a double major in agricultural economics and agricultural leadership and development.

Fifteen students agreed to participate in one of the three focus groups and all participants provided informed consent prior to participating in the study, which was approved by the Texas A&M University Institutional Review Board. Participants were identified using a purposive sample, sampling of participants with the research goals in mind (Bryman, 2012) and recruited through email and face-to-face methods. Once the focus group participants were identified and agreed to participate, a follow-up email was sent thanking them for agreeing to participate and reminding them of the date, time and location of the focus group. The day before the specified day of the focus group, a reminder email was sent to the participants (Krueger and Casey, 2000).

Prior to beginning the focus groups, participants completed a short demographic questionnaire that included gender, major, graduation year and writing-intensive courses completed. Focus group one had six students, focus group two had six students and focus group three had three students. Only three focus groups were conducted because data saturation was achieved (Krueger and Casey, 2000). A moderator conducted the focus groups and an assistant moderator observed the focus groups while taking notes related to participants' comments. Questions were related to students' definition of writing, description of the writing-intensive courses in their disciplines, experiences in writing-intensive courses and perspectives of writing factors that augment critical thinking and create knowledge.

Focus group data were transcribed, coded and analyzed based on Krueger and Casey (2000) and Lindolf and Taylor's (2011) recommended procedures. Each participant was given a code that included focus group (F1, F2, or F3) and a random corresponding number. Focus group analysis is a continuous process that begins with the first focus group and continues through the duration of the data collection (Krueger and Casey, 2000). After each focus group, the interview protocol was revised as necessary. The data were inductively analyzed using the Krueger and Casey (2000) long-table approach, arranging comments and quotes according to themes that emerged from the data, to gain "understanding based on the discussion as opposed to testing a preconceived hypothesis or theory" (p. 12).

Triangulation (cross-checking) was achieved through focus groups, moderator and assistant moderator dialogue, field notes and data collection using other research methods with similar populations because "the use of multiple forms of evidence can bring us closer to a 'true' representation of the world" (Lindolf and Taylor, 2011, p. 274). The protocol questions and students' comments and statements were used as a framework for the narrative (Krueger and Casey, 2000). An audit trail of initial analyses, field notes and exemplars was kept to maintain dependability (Lincoln and Guba, 1985).

Results and Discussion

Although students' experiences are not the only way to investigate a writing program, they provide a unique perspective. Sometimes students' dislike for a certain curriculum goes beyond the importance and significance of the curriculum to students' long held opinion about that field of study. Therefore, it is important to understand students' experiences in and attitudes about writing-intensive courses in social science departments in colleges of agriculture from a qualitative perspective. Four prominent themes emerged from the focus group data–definition of writing, writing instruction, critical thinking and learning and writing-intensive course experience.

Students within the focus groups collectively defined writing as the act of communicating information in a clear, cohesive message with organized synthesizing and collaboration of thoughts (F105, F201, F104, F106, F101). Writing is, essentially, documenting and creating a world that was not otherwise known. It is a skill that is not learned overnight or in one class, which was also noted by the Texas A&M University Writing Center (2014) and Young and Fulwiler (1986). Students have varied definitions of writing and anecdotal evidence shows that some students view writing as nothing more than using correct grammar or having neat handwriting, which, based on evidence from this study, is a skewed definition of what the infinitive verb "to write" means.

Students said a specific definition of writing depends on the context of the writing task (e.g., creative writing and academic writing; F203). Beyond context, students believed writing for social science disciplines in agriculture is expressing thoughts, messages, or points of view in an organized, concise manner using a layering process to build on ideas and add information to the structure of the work (F102, F105, F106). "*You have to keep at it. One photograph does not make you a good photographer. [It is] the same with writing. To be good you have to have feedback and build on it*" (F105).

Teaching strategies and delivery methods affect students' ability to become effective writers (F101, F102, F103, F104). Teachers should continue to push effective writing (F102) and writing repetition (F105, F205). "It is about quality over quantity" (F105). Provide clearly articulated examples of written tasks is one method teachers use to teach writing, but examples can hinder students' capacity to think creatively and excel in the classroom, which Davies and Birbili also found in 2000. Chickering and Reisser (1993) claimed that students should engage with the course material to become intellectually competent. Therefore, providing students with examples may keep them from fully engaging with the material and stifle them from developing intellectual competence.

Some students (F102, F301) believed that examples helped them become effective writers and that teachers did not provide enough concrete examples. "*I like teachers that show me a good example of what they expect. Even if it is different, show me what you want*" (F301). Courses with examples are easier because students can research and complete their project more effectively when they know what is expected. "*I like it*

to be spelled out. It is easy when it is spelled out, but it doesn't produce the best paper." (F205). When students have specifications to guide their writing, getting started and continuing the process becomes easier, which is a characteristic of unskilled writers (Bereiter and Scardamalia, 1987).

However, F104 said she preferred broader requirements because specific examples and requirements decreased her motivation to do research. "*We did not get one example of a 150-page paper, which was overwhelming at first, but then guidance wasn't necessary. Not all groups excelled without guidance, but ours did. We had a plan of attack, but some groups did not*" (F101). An example of a completed paper with a strongly developed argument may cause students to confine their work to the walls of the sterile box because they try to develop an argument that is a mirror image of the provided example. This could potentially stifle students' ability to master, understand and engage with a topic (Epstein, 1999). "*I didn't excel in classes that had formats. Without examples, I am not tempted to follow a format. My work is more original and creative without examples*" (F101). Additionally, "Having examples hindered my creative thinking. I work better in no example environments" (F106).

On the other hand, teachers can provide guidance without providing specific examples. First, they can assign students reading in their disciplines to provide examples of well-written documents without confining students' work to a box. Second, they can provide rubrics that address the requirements of each section of the project (F201, F206). "*I guess it depends on what you are comfortable with as a student and a professor. Slight rubric with just enough guidance or lots of interaction with having the option of the professor looking at it. Writing concept is subjective and rubrics provide points. Without them, it [writing] is chatter*" (F201).

Furthermore, repetitious, project building tasks are effective writing assignments, which Strachan also stated in 2008. Students learn more from writing tasks when they can develop a project through the semester and combine different writing tasks to make a complete project. "*Working on a project all semester is better than short assignments*" (F202) and "*doing research and writing until you have a project helped me learn about my project and about writing*" (F204). The amount of time students spend writing can impact how much they learn in a course and how much they improve as writers. Chickering and Reisser (1993) claimed that writing helps students develop their thoughts and ideas while reflecting on their own thinking. Writing in intervals helps students to master writing skills and develop as effective writers. Feedback must be provided in a timely manner throughout the semester if students are to learn from their mistakes and improve on the next assignment, which Strachan (2008) found to be true as well. Providing feedback at the end of the semester does not help students become effective writers.

Although writing-intensive courses helped two students become critical thinkers (F101, F106), the courses did not contribute to other students' ability to think critically (F201, F202, F204, F302). Writing assignments that make students think are the most engaging (F102), so perhaps, it is specific assignments that help students become critical thinkers and not the course material. Students (F203, F205) appreciated assignments that required them to research a topic and present the topic's opposing viewpoint because it helped them realize more than one view existed. "*I still believe the way I did, but it altered my thinking some. My thoughts are closer to the middle than they were before the assignment*" (F205).

Often times, students do not have the opportunities to defend their information (written or oral) because of large classes or teacher demands in other areas of the academy, which leaves students without the opportunities to develop critical thinking skills. One student (F101) said "*when you write, you defend the information and when you have to defend the information, you have to know your stuff*." If writing tasks do not incorporate components that require students to develop an argument or defend their position, it is hard for them to develop critical thinking skills. As Wilson found in 1986, students are more likely to think critically when writing argumentative assignments. Some of the students in the focus group, though, reported that they write with a stream of consciousness, which Bereiter and Scardamalia (1987) said is representative of a writer who is unskilled and writes using the knowledge-telling strategy.

Writing-intensive courses, in theory, are mechanisms that assist students in becoming effective writers. According to the students in this study, some writing-intensive courses help students become effective writers and others do not, which might be because they do not receive the necessary feedback to improve their writing abilities. Each student has a different experience in writing-intensive courses. One student enjoyed writing-intensive courses but believed writing skills were not improved (F106). Whereas, feedback in writing-intensive courses did not help one student (F202) become an effective writer, but feedback in non-writing intensive courses did help her become more effective (F301). Improvement comes from specific feedback. When feedback is vague and only tells students whether their work was acceptable or not, it does not help them improve or build on their writing (F106).

However, writing-intensive courses do provide students with writing resources they can use as guides in the future (F301). "*I want to be a lawyer or go into government relations, which are two of the careers more focused on writing. [It is important] for me to write, understand research and [form] cohesive sentences*" (F101). Writing-intensive courses have helped students learn ways to effectively portray thoughts, learn the diction of the discipline, overlook superfluous information and be concise (F101, F103, F201). One student (F103) said writing-intensive courses provided her with writing

opportunities that challenged her and helped her discover the vocabulary used in her discipline, but she does not feel confident writing about research. “I learned material because I wrote about it” (F106). These courses help students learn to research and develop thoughts about information pertinent to their career.

Recommendations

Improving students’ writing abilities is more than just stating criteria and implementing the criteria in the course. More research needs to be conducted on the types of writing tasks that intensify students’ ability to think critically. Instruments need to be developed and tested to determine which writing tasks help students become effective writers who can analyze information and think critically.

Foundational studies, such as this one, need to be conducted to develop instruments that measure educational effectiveness of the methods used to teach writing. Those teachers who teach writing but are not trained to teach writing may tend to avoid facing the writing crisis because writing is subjective and the ways to assess writing are not fully developed. However, if students are to become effective writers, then writing teachers and researchers need to develop robust ways to teach writing and to measure educational effectiveness.

Because students said writing depends on context, each department, or perhaps major, should develop a writing definition beyond that of what writing means to students in social science departments in the College of Agriculture and Life Sciences at Texas A&M University. Moreover, depending on the major, the definition of writing could be course specific. For example, agricultural communications and journalism students are required to take a variety of agricultural writing courses (e.g., media writing, public relations writing and technical writing), which are conceptually different. Whereas, writing in agricultural communications and journalism is contextually different than writing in agricultural economics.

Further, similar studies should be conducted with the bench science departments in colleges of agriculture. Just as Fulwiler and Young (1990) stated that writing instruction is not the same at all institutions, writing is not the same in all disciplines or all divisions within an industry. The results of this study cannot be generalized to a larger population because the study took place at a particular time with a specific group of people. However, it can be replicated at different institutions to determine students’ perspectives of writing across colleges of agriculture and begin to develop a literature base that can be used to enhance writing instruction in agriculture.

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Communication Technology Training Beyond the University Campus: A Case Study of Skill Development in the Arkansas Cooperative Extension Service

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Abstract

Faculty at a Land Grant university provided communication technology training to Cooperative Extension Service personnel in a face-to-face, five-day workshop covering seven lessons focused on communication technology (Social Media, Video Media, Photography Media, Professional Networking Media, Collection Media, Publishing Media and File Sharing Media). This training was provided to select Extension personnel identified as early adopters in an effort to increase communication-based technology understanding, knowledge and use in the state. Upon completion of each lesson, Extension personnel (N = 23) participated in hands-on learning exercises to contribute to their understanding of concepts and the development of digital media products that would enhance participants' program areas. Participants felt the technology "they actually use," had the "greatest ability to use," and "expected to use most in the future" was the Internet. When asked to self-rate their technology literacy, 70% of participants rated themselves as "intermediate." Participants gained the greatest enjoyment from the Photography Media lesson in the workshop and the least enjoyment from the Professional Networking Media lesson. Only 17% of participants reported high interest in teaching technology to their clients. When asked the likelihood of using communications technology as part of a digital media integration plan, participants rated all but one (Professional Networking Media) of the seven media covered as "very likely" to use. This research showed the value of using university faculty to provide professional development and technical expertise training to Cooperative Extension Service personnel.

Introduction

Today's Land Grant universities are required to achieve more with less funding, while improving their reach and impact. With a university system mission focused on teaching, research and service, it is important for faculty and state Cooperative Extension Service personnel to forge new alliances and work together to improve dissemination of information from campus to the public. Alliances with university faculty and Extension allow the opportunity for content experts to share their knowledge and skills directly with Extension agents who are charged with extending the research and knowledge base from campus to the public.

"*Having the ability to create, host and facilitate access to educational materials and information over the Internet creates many new opportunities for Extension educators"* (Rich et al., 2011, p.2). *However, the "physical separation that exists in distance education requires that instructors plan, present, interact and perform in ways that are significantly different from traditional face-to-face instruction*" (Irani et al., 2003, p.48). This provides an opportunity for "faculty innovators on the cutting edge of using technology in the classroom," to work with Extension personnel to formulate materials to better reach Extension's diverse client group (Irani et al., 2003, p.48). This collaboration between academic faculty and Extension professionals creates an effective link to disseminate knowledge from the campus to diverse audiences.

This act of service to Extension personnel can positively impact bonds between Extension agents and specialists and university faculty. While many university faculty members work in Extension roles supporting technical content areas, an opportunity exists for professional and technological skill development through relationships between Extension personnel and academic faculty members not in Extension roles; this paper serves as a case study using agricultural communications faculty to train Extension agents in communication technology. While Extension has been providing training, education and professional

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development opportunities to the general public since its inception, incorporating a "train the trainer" partnership between faculty and Extension personnel, especially those in the field, is a new concept for Arkansas and could further the reach and impact of Extension educational programs to the public, as well as enhance the skill level and expertise of Extension personnel.

"*Achieving the mission of the Cooperative Extension System and maintaining our strength as educational leaders are hinged on our professional competence and technical expertise. Today as never before, professional development will help us achieve the level of excellence we expect from ourselves and ought to have for Extension in order to make a statewide, national and global impact*" (Stone and Coppernoll, 2004, p. 1). The six areas of Extension professional development needs outlined were: (1) Subject matter expertise with technology integration, (2) Organizational effectiveness, (3) Develop and involve others, (4) Communications, (5) Action orientation and (6) Personal effectiveness (Stone and Coppernoll, 2004). However, today's Extension agent must be a technical expert as well as skilled and competent in diverse electronic information development and dissemination (Diem et al., 2011; Telg et al., 2007).

Since the early 19th century, face-to-face transfer of information from the Land Grant institution has been augmented by mediated channels of communication, ranging from print and broadcast media to the Web (Baker et al., 2009). Stevens (1991) noted Extension programming should include conferences, printed material, press releases, radio and county meetings, as well as advanced media such as video to enhanced traditional educational delivery. In a study conducted by Rhoades et al. (2008), the authors call for continued research on this topic in order to enable effective use of the technologies.

Electronic media continues to change and improve at a rapid rate and the social media movement and agriculture-related technologies have gained popularity over the past decade. This requires Extension to determine its needs related to leveraging this media by determining the needs of its clientele. These needs can best be determined by needs assessments (Witkin and Altschuld, 1995).

According to Diem et al. (2011), "*a balanced approach to reaching new audiences and maintaining traditional supporters is key to Extension's future*" (p. 3). A balanced approach should include the following actions: Extension leadership needs to (1) model the use of technology, (2) establish and implement a state Extension technology plan based on Extension leadership directives and a needs analysis, (3) promote and recognize technology use by faculty, staff and volunteers and (4) dedicate resources and support to improve success. The same authors also noted that Extension has been a leader in field-testing new technologies and adopting new practices (Diem et al., 2009). However, Seger (2011) noted that many barriers exist to the successful implementation of technology in Extension, because the organizational structure of Extension does not cater to the short turn-around demands of new technology. In spite of the barriers, LaBelle (2011) explained the "*need to create instructional content for mobile platforms is an obvious step towards reaching new and existing Extension audiences*" (p. 1).

Formal education and training can assist Extension personnel with improving upon their lack of communications knowledge or skills and can provide an opportunity for media integration and programmatic improvement (Boone et al., 2002; Boyle, 1981). This concept can most certainly apply to digital media in the same way it has to traditional print and broadcast media.

The diffusion of innovations can be and usually is, a long, intricate process. Rogers (2003) developed a widely used model for following a new product through the diffusion process. Extensive research has focused on using Rogers's model to study the importance of the technological innovation and delivery and dissemination methods in Extension (Boleman and Dromgoole, 2006; Harder and Linder, 2008; Xu and Kelsey, 2012). Rogers (2003) defined diffusion as "*the process in which an innovation is communicated through certain channels over time among the members of a social system*" (p. 5).

Among the main facets of Rogers's (2003) theory is an important group of people who are key players in launching the adoption of a new technology. Referred to as "early adopters," these individuals are willing to step outside the norm and try something new before it has been proven beneficial. Once early adopters complete the five stages of the innovation-decision process, they are instrumental in spreading the word about the benefits of a new technology throughout a social system. Knowledge of new curriculum can be achieved by developers attending events where early adopters will be as well as conducting meetings with these individuals. In the case of a curriculum unit the social system would be educators of the same content. "*The early adopter is respected by his or her peers and is the embodiment of successful, discrete use of new ideas*" (Rogers, 2003, p. 283).

With a continuous stream of new digital communications media, many Extension personnel struggle to use the technology effectively for educational purposes. This educational need can be met with joint collaborative initiatives between agricultural communications (ACOM) academic faculty and state Cooperative Extension Services. Today's Extension agent must be a technical expert as well as skilled and competent in diverse, electronic information development and dissemination (Diem et al., 2011; Telg et al., 2007). Because ACOM faculty typically have experience in and teach about new digital media, a joint relationship between Extension and ACOM academic faculty can enhance the integration of technology in Extension education. Furthermore, the "*creation of programs that develop the skills and competencies necessary to improve the communications and knowledge sharing effectiveness of all in the agriculture-related workforces of societies*" (Doerfert,

2011, p. 9) was outlined in the American Association for Agricultural Education National Research Agenda as a research need area. In addition, developing and assessing "*various learning interventions and delivery technologies to increase problem-solving, transfer of learning and higher order thinking across all agricultural education contexts*" (Doerfert, 2011, p. 9) was also identified as a key research goal. Research and collaborative efforts by ACOM and Extension personnel are critical to enhance digital media use for information dissemination.

The purpose of this study was to assess participants' knowledge development and skill-level increase in specific electronic communication competencies taught in an educational program for Extension professionals. The following specific research objectives guided the study:

1. Determine the instructional preferences of participating Extension personnel;
2. Determine participants' perceived use, proficiency and future use of selected communication technology; and
3. Determine the overall perceived effectiveness and value of the Extension Digital Media Academy (intensive five-day, face-to-face training) experience.

Materials and Methods

In the summer of 2012, the University of Arkansas developed curriculum for the Extension Digital Media Academy (EDMA), a five-day, face-to-face intensive training program for Extension personnel. Three ACOM faculty members from the University of Arkansas administered training program, which focused on the following communications technology instructional areas: (1) Social Media, (2) Video Media, (3) Photography Media, (4) Professional Networking Media, (5) Collection Media, (6) Publishing Media and (7) File Sharing Media. The purpose of this program was to improve Extension personnel's digital media competencies. The program sought to enhance electronic communication skills for educational program development and delivery through experiential activities. This study was limited to the number of participants accepted into the EDMA program. Participants (N = 23) were selected by state Cooperative Extension Service staff to participate in the training. The findings of this study cannot be generalized to others beyond EDMA participants. However, inferences and training application to other Extension personnel groups may prove valuable to readers.

Day one of the training consisted of an open meet-and-greet and introductory instruction. This allowed participants to gain an understanding of new media terms and identify new media topics to be integrated into education plans. Extension personnel participated in self-directed media exploration and team collaboration to better understand new media topics and the concept of integrating media into Extension programs.

Day two began with a pre-workshop perception survey administered to determine participant instructional preferences and perceptions of technology. The instrument contained items on a 1 to 4 Likert-type scale designed to determine respondent perceptions. At the completion of the instrument, instructors covered the topics of camera parts and functions, photo composition and photo editing. Participants captured photographs on the University of Arkansas campus and edited them.

Day three involved participants using PowerPoint® presentations, created prior to the training, to create voice-over PowerPoint® videos using TechSmith® Camtasia. The videos were intended to be incorporated into participants' Extension educational programs. Participants were also introduced to photograph shot sheets and storyboards that were used in their teams to create group videos the following day. The photograph shot sheets and storyboards served as planning pages for the teams in the development and execution stages of their videos. Participants were able to plan for video footage and photographs needed for the completion of their group videos.

Day four covered topics that included video camera parts and functions, shooting techniques and video editing. Participants worked in teams to capture footage relevant to a chosen Extension program area and create an instructional video. The videos were rendered and posted to YouTube by each participant group.

On the final day of the intensive training, participants developed digital media integration plans that incorporated the skills acquired from the workshop into each of their respective program areas. Participants shared their plans with the larger group and discussed ways to integrate the skills learned in the workshop. Participants voted on the most successful digital media products created by their peers throughout the workshop. At the end of the EDMA, participants were honored in an award ceremony.

One week after the completion of the intensive training, a post-workshop instrument was administered to Extension personnel who participated in the workshop to gauge the effectiveness of the training, as well as to gain demographic information from participants. Perception questions were adapted from an instrument by Silance and Remmers (1934) to fit the content of this study. The perception section of the survey contained 20 items on a 1 to 4 Likert-type scale designed to determine respondent perceptions about the digital media curriculum. To prevent response set (respondents selecting the same specific response for each question), seven of these 20 items were negatively worded. Negatively worded questions were reverse coded for analysis. Participants were also asked to complete questions regarding the intensive hands-on training experience. The researchers followed Dillman's Tailored Design method (2007) to reduce instrumentation bias in question wording.

A panel of three faculty members (from agricultural communications) examined the instrument and judged it to possess face and content validity. Alpha coefficients, for the researcher developed survey, were assessed

on specific content sections and ranged from 0.62 to 0.79 for the dependent variables guiding this study. According to Nunnally (1967), a modest reliability of 0.60 is sufficient during early stages of research. Data were analyzed using descriptive statistics (means and standard deviations).

Results and Findings

Among the participants (N = 23) surveyed 33% were male and 67% were female. Of these participants, 86% were Caucasian, 9.5% were African American and 4.8% were Native American, African American and Caucasian. Twenty-four percent of participants had earned a four-year college degree, 43% had earned a master's degree and 33% had earned a doctoral degree.

Participants' total years with Extension ranged from less than one year to more than 10 years. Of the responding participants, 4.8% had been with Extension less than one year, 19% had been with Extension one to three years, 24% had been with Extension four to five years, 24% had been with Extension six to 10 years and 29% had been with Extension for more than 10 years. Five participants identified their program area with Extension as Family and Consumer Science (with one specifying Child Care and one specifying Nutrition), two listed Community and Economic Development, one listed 4-H Youth Development, one listed Agriculture Business/Agriculture Economics (Economist), one listed Agriculture and Water Quality, one listed Animal Science, one listed Aquaculture/Fisheries, one listed Bio Energy, one listed Forestry, one listed Horticulture, one listed Information Technologies, one listed Natural Resources, one listed Nutrition, one listed Support/Not Program and two participants did not answer the question.

Instructional Preference

When asked their interest in teaching technology to their clients, 17% of participants reported "high interest," 61% reported "medium interest," and 22% reported "low interest." Participants also were asked to rate their instructional preference on a 4-point Likert-type scale ranging from "strong" to "not at all" for each of eight categories of instructional methods (i.e., group instruction, intensive session (boot camp), video, audio recordings, computer-assisted tutorial, printed workbooks/handouts, independent study, demonstration with hands-on learning exercises) under study. Participants' highest instructional preference was for demonstration with hands-on learning exercises, rated "strong" to "intermediate" (M = 1.52, SD = 0.75) (Table 1). The participants' lowest instructional preference was rated as "intermediate" to "somewhat" for an intensive session (boot camp) (M = 2.38, SD = 0.87).

Participants rated themselves as "intermediate" to "advanced" in terms of technology literacy and reported having learned about technology through a variety of methods. Seventy percent of participants rated themselves as "Intermediate – will try most technology but not proficient in some," and 30% of participants rated themselves as "Advanced – knowledgeable and people come to me for assistance." When asked where they learned what they know about technology, 29% of participants indicated they learned from formal courses, personal informational study and valued colleague(s), with one specifying learning from a combination of the three and one specifying learning from peers. In addition, 9.5% of participants reported learning from formal courses, personal informational study, valued colleagues and "other." Of the participants, 33% reported they learned from personal, informational study and 9.5% reported learning from personal, informational study and "other." Finally, 19% of participants reported learning from personal study and valued colleague(s) guidance and input.

Table 1. Participant Instructional Preference (N = 23)

Item	n	M[a]	SD
Group instruction	21	1.86	.91
Intensive session (boot camp)	21	2.38	.87
Video	21	2.19	.87
Audio recordings	21	2.29	.85
Computer-assisted tutorial	21	1.90	.63
Printed workbooks/handouts	20	1.90	.72
Independent study	21	2.00	.71
Demonstration with hands-on learning exercises	21	1.52	.75

[a]Means are based on a Likert-type scale where 1 = Strong, 2 = Intermediate, 3 = Weak, and 4 = Not at all

Technology Use

Participants rated their ability to use technology on a 4-point Likert-type scale ranging from "advanced" to "not at all" for each of the fourteen categories (i.e., preparation of instructional materials, data recording and calculation, graphics and drawing, tutorials to explain concepts/methods, drill and practice (experimental), discovery learning/problem solving, word processing, simulations, database searching and research, Internet, CD-ROM for multimedia, distance learning, web resources for learning, web resources for teaching) under study. Table 2 notes participants' reported ability to use the Internet as "advanced" to "mostly advanced" (M = 1.30, SD = 0.47) as compared to participants ability to use graphics and drawing as "mostly advanced" to "somewhat advanced" (M = 2.83, SD = 0.72).

Participants rated their actual use of technology, as well as their expected future use of technology,

Table 2. Extension Personnel's Ability to Use Technology (N = 23)

Item	M[a]	SD
Preparation of instructional materials	1.74	.54
Data recording and calculation	1.74	.92
Graphics and drawing	2.83	.72
Tutorials to explain concepts/methods	2.22	.80
Drill and practice (experimental)	2.26	.86
Discovery learning/problem solving	2.00	.60
Word processing	1.35	.49
Simulations	2.61	.84
Database searching and research	1.61	.66
Internet	1.30	.47
CD-ROM for multimedia	1.65	.78
Distance learning	2.26	.69
Web sources for learning	1.83	.58
Web sources for teaching	2.13	.63

[a]Means are based on a Likert-type scale where 1 = Advanced, 2 = Intermediate, 3 = Novice, and 4 = Not at all

on a 4-point Likert-type scale ranging from "always" to "never" for each of the fourteen categories under study (i.e., preparation of instructional materials, data recording and calculation, graphics and drawing, tutorials to explain concepts/methods, drill and practice [experimental], discovery learning/problem solving, Word processing, simulations, database searching and research, Internet, CD-ROM for multimedia, distance learning, web resources for learning, web resources for teaching). Table 3 reveals participants' actual use of the Internet was "always" to "mostly" (M = 1.05, SD = 0.22) and actual use of drill and practice (experimental) was "mostly" to "somewhat" (M = 2.84, SD = 0.83). Table 3 also shows participants' expected future use of the Internet as "always" to "sometimes" (M = 1.30, SD = 0.56) and participants' expected future use of simulations as "sometimes" to "rarely" (M = 2.65, SD = 0.65).

Participants rated their personal skills or proficiency level in visual communications on a 4-point Likert-type scale ranging from "advanced" to "not at all" for each of the 11 categories under study. The categories included using a video camcorder(s), editing video using computer software, editing multiple captured videos into a new product, creating a story line (storyboarding), video composition (shooting angles, lighting, etc.), using digital camera(s), photo composition (angles, rule of thirds, framing, etc.), editing photos using computer software, copyright and fair use laws, uploading files to the Internet and identifying useful social/electronic media web resources (Table 4). Participants rated their personal skills or proficiency levels for uploading files to the Internet between "advanced" and "intermediate" (M = 1.48, SD = 0.59) and their personal skills or proficiency levels for editing multiple captured videos into a new product as "intermediate" to "novice" (M = 2.70, SD = 0.82).

Academy Effectiveness

Participants rated the relevance of EDMA training to their job responsibilities on a 4-point Likert-type scale ranging from "highly relevant" to "not relevant at all" for each of the seven categories (i.e., social media, video media, photography media, professional networking media, collection media, publishing media, file sharing media) under study (Table 5). Participants identified file sharing media as "relevant" (M = 1.70, SD = 0.56) and professional networking media as "relevant" to "somewhat relevant" (M = 2.43, SD = 0.84).

Participants rated their level of enjoyment of training topics on a 4-point Likert-type scale ranging from "very enjoyable" to "not enjoyable at all" for each of the seven categories (i.e., Social Media, Video Media, Photography Media, Professional Networking Media, Collection Media, Publishing Media, File Sharing Media) under study (Table 6). Extension personnel noted that they found photography media "very enjoyable" to "enjoyable" (M = 1.70, SD = 0.88). They also noted that they "enjoyed" to "somewhat enjoyed" professional networking media (M = 2.13, SD = 0.63).

Participants rated the likelihood that they would use each of the seven categories (i.e., Social Media, Video Media, Photography Media, Professional Networking Media, Collection Media, Publishing Media, File Sharing Media) under study as a part of a digital media integration plans in their jobs. This topic was assessed on a 4-point Likert-type scale ranging from "very likely"

Table 3. Extension Personnel's Current and Future Use of Technology (N = 23)

		Current Use		Future Use	
Item	n	M[a]	SD	M[a]	SD
Preparation of instructional materials	21	1.29	.56	1.65	.57
Data recording and calculation	21	1.81	1.03	1.87	.69
Graphics and drawing	21	2.24	1.09	2.48	.73
Tutorials to explain concepts/methods	21	2.38	.92	2.17	.65
Drill and practice (experimental)	19	2.84	.83	2.39	.78
Discovery learning/problem solving	21	2.38	.97	2.17	.83
Word processing	21	1.24	.54	1.35	.49
Simulations	21	2.90	.89	2.65	.65
Database searching and research	21	1.52	.81	1.74	.75
Internet	21	1.05	.22	1.30	.56
CD-ROM for multimedia	21	2.33	.91	2.39	.72
Distance learning	20	2.50	1.19	2.10	.79
Web sources for learning	21	1.76	.83	1.70	.56
Web sources for teaching	21	2.00	.89	1.96	.56

[a]Means are based on a Likert-type scale where 1 = Always, 2 = Frequently, 3 = Rarely, and 4 = Never

Table 4. Personal Skills or Proficiency Levels in Visual Communications (N = 23)

Item	M[a]	SD
Using a video camcorder(s)	2.39	.58
Edit video using computer software	2.57	.66
Edit multiple captured videos into a new product	2.70	.82
Creating a story line (storyboarding)	2.26	.69
Video composition (shooting angles, lighting, etc.)	2.61	.58
Using digital camera(s)	1.83	.39
Photo composition (angles, rule of thirds, framing, etc.)	1.96	.56
Edit photos using computer software	2.39	.72
Copyright and fair use laws	2.52	.67
Upload files to the Internet	1.48	.59
Identifying useful social/electronic media web resources	2.00	.85

[a]Means are based on a Likert-type scale where 1 = Advanced, 2 = Intermediate, 3 = Novice, and 4 = Not at all

Table 5. Relevancy of EDMA Training to Participant Job Responsibilities (N = 23)

Item	M[a]	SD
Social Media	1.96	1.02
Video Media	1.83	1.03
Photography Media	1.87	.87
Professional Networking Media	2.43	.84
Collection Media	1.96	.71
Publishing Media	1.83	.65
File Sharing Media	1.70	.56

[a]Means are based on a Likert-type scale where 1 = Highly relevant, 2 = Somewhat Relevant, 3 = Not very relevant, and 4 = Not relevant at all

Table 6. Participant Level of Enjoyment of EDMA Training Topics (N = 23)

Item	M[a]	SD
Social Media	1.87	.87
Video Media	1.87	.81
Photography Media	1.70	.88
Professional Networking Media	2.13	.63
Collection Media	2.00	.52
Publishing Media	1.87	.46
File Sharing Media	1.87	.46

[a]Means are based on a Likert-type scale where 1 = Very enjoyable, 2 = Somewhat enjoyable, 3 = Not very enjoyable, and 4 = Not enjoyable at all

Table 7. Likelihood of Participant Using Media Learned as part of the Extension Digital Media Academy in Their Digital Media Integration Plans (N = 23)

Item	M[a]	SD
Social Media	1.78	1.09
Video Media	1.78	1.00
Photography Media	1.61	.78
Professional Networking Media	2.26	.96
Collection Media	1.87	.92
Publishing Media	1.70	.70
File Sharing Media	1.57	.59

[a]Means are based on a Likert-type scale where 1 = Very likely, 2 = Somewhat likely, 3 = Somewhat unlikely, and 4 = Not at all likely

to "not at all likely" for each of the seven categories. Table 7 reveals participants as being "very likely" to "likely" to use file-sharing media (M = 1.57, SD = 0.59). Extension personnel also noted that they were "likely" to "somewhat likely" to use professional networking media (M = 2.26, SD = 0.96).

Summary

Extension personnel consistently agreed that their overall instructional preference was demonstration with hands-on learning exercises. Therefore, respondents would be expected to enjoy the instructional style of the Extension Digital Media Academy. It can further be postulated that participants prefer showing constituents the answers to Extension-related questions, rather than having constituents watch a video on the Internet. Only 17% of participants reported "high" interest in teaching technology to their clients and 62% of participants did not list topics they taught or needed to know that should be included in Extension training. Previous research findings noted a high demand of technology integration in Extension that has morphed the role of agents (Diem et al., 2011; Stone and Coppernoll, 2004; Telg et al., 2007), our study does not support this notion as many EDMA participants lacked knowledge and skills in innovative communication technology.

Further, it was found that participants perceived their use of the "Internet" as their highest ability to use, actual use and expected future use of digital media technologies. Despite their low ratings of interest in teaching technology to their clients, 70% of participants rated themselves as "Intermediate - will try most technology but not proficient in some" and 30% of participants rated themselves as "Advanced - knowledgeable and people come to me for assistance." Additionally, 33% of participants indicated they learned what they currently knew about technology from formal courses and informational study. It can be postulated that while participants were not comfortable teaching communications technology to clients, they considered themselves proficient in topics concerning technology and recognized the need for formal courses and informational study to gain knowledge of communication technology integration. Extension personnel must recognize the new opportunities created through having the ability to provide access to educational materials over the Internet (Rich et al., 2011). Furthermore, given personnel proficiency using the Internet, integrating educational materials through this medium could aid in the adaptive functioning of a healthy Extension work environment (de Vries, 2001).

In all three categories of conference effectiveness, Professional Networking Media was rated as the least relevant, least enjoyed and least likely to be used of all Extension Digital Media Academy workshop topics. The study conducted by Stone and Coppernoll (2004) hinged the ability of Extension to achieve its mission and maintain its strength as an educational leader on professional competence and technical expertise. Of the professional development needs outlined, EDMA focused on (4) Communications (Stone and Coppernoll, 2004). Professional development was stated as the key to achieving the level of excellence expected from Extension "today as never before" (p. 1). However, this study showed that the participating Extension personnel did not find value in this type of professional development.

Agricultural communications faculty and practitioners must assist Extension personnel with finding value in these types of activities in order to further the "*creation of programs that develop the skills and competencies necessary to improve communications and knowledge-sharing effectiveness*" (Doerfert, 2011, p.9) of the Cooperative Extension Service in every state. Today's Extension agent must remember the importance of being a technical expert, in addition to recognizing the need for diverse skills and competencies in electronic information development and dissemination (Diem et al., 2011; Telg et al., 2007). It should be noted that participant results may have been affected by a lack of understanding of the professional development uses of this intensive training curriculum in digital media. In future trainings with Extension personnel, the instructional preferences of participants should be considered when identifying new modes of instruction to engage agents in professional development. This will continue to develop the "problem-solving, transfer of learning and higher order thinking" (Doerfert, 2011, p.9) of Extension professionals. Further research should be conducted during similar workshops involving Extension personnel to determine the most appropriate learning environments, such as web conferencing, in-person trainings, etc. and compare instructional preferences and the effect on knowledge and/or perceptions of the communications technology. This could incorporate the "balanced approach" needed to reach new audiences as well as maintain traditional supporters (Diem et al., 2009).

It is unknown whether Extension personnel have continued to develop and refine any of the communications technology skillsets covered during the EDMA workshop and, if so, how the new technologies are being received by Extension constituents. Research results of this study support the continued delivery, use and training of communication technology, gained through programs like EDMA. Increasing training opportunities that participants "enjoy" and add to "lifetime learning" can enhance

the skill base of the workforce (Friedman, 2006, p.170). Further research should be conducted with the clientele of the Extension personnel completing the intensive training. It should be determined whether the integration of communications technology has improved the education and overall experience of Extension clientele. Additionally, another characteristic to be analyzed is whether or not clientele feel more engaged with their respective Extension personnel since the development and implementation of EDMA participants' digital media plan.

In the spring of 2014, Arkansas Extension will be launching its new website. At this time, all county offices will have increased technology usage, because each office will be responsible for its respective webpages. Therefore, additional research should be conducted regarding the actual integration of communication technology skills from the EDMA. Comparisons should be made between the overall knowledge, perceptions and job satisfaction of Extension personnel working on the website who completed EDMA training and personnel who did not. Additionally, with digital media technology being a relatively new topic for Extension training, initial benefits may have been difficult for participants to predict. Research should seek to improve the workshop curriculum and identify areas of technology training weaknesses. To accomplish this, a needs assessment instrument should be disseminated to a random sample of Extension personnel annually to identify future training needs. These identified needs should shape future curriculum content and workshop delivery.

Extension personnel should have access to resources that will allow them to expand their knowledge of communication technology integration. The EDMA participants had the strongest interest in learning through hands-on activities and were the most confident in their use of the Internet. Therefore, resources should be provided via the Internet that allow for hands-on activities that encourage the development of skills in communications technology, specific to use by Extension personnel. Extension agents must continue to learn about changing communication technology and the use of the Internet provides an outlet for all of Extension to disseminate the information necessary to educate agents via a positive medium. Not all agents are early adopters or innovators (Rogers, 2003), but they should be technologically savvy to meet the changing needs of their clientele. There is a growing need for agents to increase and refine their skills in digital media that can only be met through education of the agents themselves. This education can come from postsecondary academia faculty building relationships with the Cooperative Extension Services in their own states and educating Extension personnel on digital media and communication technology. Faculty members in all disciplines have the knowledge and potential resources necessary to provide needed training for Extension personnel, as the "number of faculty innovators on the cutting edge of using technology" has "grown in recent years" (Irani et al., 2003, p.48). Additionally, "many agricultural faculty members are called upon to teach in Extension adult education programs" already (Miller and Kitinoja, 1993, p.33). Postsecondary educators in the agricultural sector can formulate lessons and curriculum incorporating the agricultural aspects of Extension's work. The assessment of conference effectiveness showed that participants enjoyed the curriculum as a whole. Therefore, workshops of this type should be implemented throughout the U.S. and further research on this type of curriculum in training Extension personnel should be completed.

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Posting Horse Show Patterns Before Youth Show Creates Positive Experience for Youth and Adults[1]

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Abstract

Members of the South Dakota 4-H Horse and Pony Project and their parents or leaders were surveyed about their experiences with receiving access to horse show patterns in advance of the 2012 State 4-H Horse Show. Authors anticipated improved comfort and performance with accompanied reduction in stress and anxiety in youth. Youth and adults reported this to be helpful to them, as they felt their stress and anxiety was not only minimized, but also that their ability to learn the patterns was maximized. Youth's ability to perform, as well as their ability to have fun at the show, were also increased in the eyes of youth and adults alike. 4-H Beginners (ages 8-10) and Juniors (ages 11-13) expressed a greater preference for accessing patterns in advance of the horse show than Seniors (ages 14-18), but age did not play a role in how youth rated their stress, anxiety, fun, comfort, or their abilities to learn and perform the patterns. Adults also gleaned benefits from access, rating the effects on themselves similarly to their youth in every category except enhancing their personal comfort. An overwhelming majority of both youth (98%) and adults (95%) prefer early access to horse show patterns in the future.

Introduction

4-H Horse programs provide excellent opportunities for youth to learn about and interact with horses. Development of life skills and positive opportunities for learning are evident. Horse project members participating in non-riding horse contests in Nebraska reported learning how to handle pressure, realizing the importance of learning and following rules and learning how to plan ahead as just a few of the life skills moderately or strongly attributed to their 4-H projects (Anderson and Karr-Lilienthal, 2011). Additionally, development of horsemanship and total life skills has been found to go hand in hand (Smith et al., 2006).

Participation in a horsemanship related activity has been associated with positive self-esteem (Saunders-Ferguson et al., 2008). Further, youth who were enrolled in 4-H horse knowledge contests for several years generally perform better in those contests than youth competing for the first or second time (Nadeau et al., 2007). Thus, it would be logical to assume that youth who have access to horse show patterns for longer periods of time would become more confident in their abilities.

During horse shows, youth are frequently required to exhibit a specific pattern or routine with their horse. These patterns are designed to test the youth's knowledge and ability to perform important maneuvers with their horses. Traditionally, patterns at youth horse shows have been posted on premise, often in as little as one hour in advance of the competition. Breed and other large industry shows are trending towards providing open access to patterns well in advance of horse shows. For example, the All American Quarter Horse Congress, the largest single breed horse show in the world, has been posting their patterns in advance for the past 8 years. In effect, this allows contestants to be judged on their mastery of skills and communication with horses without also testing their ability to quickly memorize and perform a pattern.

Learning is a dynamic process, which may be enhanced when learners have more time to spend with a topic. Brye and colleagues (2005) evaluated perfor-

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mance of graduate-level students on an open-note make-up exam, identical to an initial exam, but administered twelve days later. Performance on the second exam was enhanced over the initial exam. While access to notes during the exam may have contributed to these improvements, the extra time to work with a familiar set of problems cannot be discounted as a benefit. Student performance and perceived-stress in a veterinary virology course were improved during exams where students were allowed to prepare and use crib sheets as compared to exams where this was not permitted (Vogelweid et al., 2014). Further, physiological and perceived stress at the time of learning can impair memory function (Schwabe and Wolf, 2010). Thus, the context in which learning occurs can greatly impact learning, performance and stress.

Table 1. Responses of youth regarding the availability of horse show patterns before the show on anxiety, comfort, stress, and fun.

	Frequency of Response (%)					
Question	1	2	3	4	5	N
How did access to patterns affect your anxiety level?	38.71	22.58	25.81	9.68	3.23	31
How did access to patterns affect your comfort level?	3.13	18.75	21.88	18.75	37.50	32
How did access to patterns affect your stress level?	36.67	23.33	30.00	6.67	3.33	30
How did access to patterns affect your level of fun at the show?	6.67	0.00	30.00	30.00	33.33	30

Responses based on a scale of 1-5 (1=minimized, 3=neutral, 5= maximized).

Posting horse show patterns in advance is a "new" way to deliver information to youth and may impact comfort level, performance and show experience of participants. However, there are no data published to date which support potential benefits or pitfalls associated with early access to horse show patterns. The objective of the current study was to characterize the perceived impacts of offering patterns in advance of a 4-H horse show on a myriad of factors including stress, anxiety, comfort, fun in youth participants and associated adults and as well as the desired learning outcomes of the ability of youth to learn and to perform.

Materials and Methods

Pattern Availability

SDSU Extension and HorseShowPatterns.com partnered to provide online access to patterns for the 2012 South Dakota State 4-H Horse Show. The State Horse Show Judges provided patterns, which were in accordance with the SD 4-H Horse Project Show Guide rules in advance. Patterns were produced by HorseShowPatterns.com and posted two weeks prior to the horse show. In an attempt to alert horse show participants to the availability of patterns, they were promoted through iGrow Horses (a service of SDSU Extension), Extension personnel and HorseShowPatterns.com. Duplicate patterns were also posted on-site at the state horse show.

Surveys

This project and survey were approved by the South Dakota State University's Internal Review Board (approval # IRB-1209006-EXP). QuestionPro surveys were developed to target youth participants and adults regarding their experiences. Parallel surveys were created for youth and adults to gleam insight to how early access to patterns make have affected the overall horse show experience. Surveys were posted approximately one month after the state horse show, promoted and kept active for one month. Youth were asked a series of questions pertaining to their preference of pattern posting for the next show and how early access to the patterns affected a variety of variables (Table 1), most importantly their ability to learn and perform as a result of pattern access. Adults were asked to reflect of how early access affected them and how they perceived it to affect their youth.

Statistical Analysis

A Kruskal-Wallis test was performed using SAS (Cary, NC) to determine differences in preference for accessing patterns prior to the show (scored on a scale of 1-5). Wilcoxon Signed Rank Tests were used to determine differences in adult perceptions of how early access affected them versus how they believe it affected their youth. Differences were considered significant with a P-value of less than or equal to 0.05.

Results and Discussion

Youth Survey

Forty-eight youth from the South Dakota 4-H Horse Project, including 14 Beginners (ages 8-10) and 17 each of Juniors (ages 11-13) and Seniors (ages 14-18), completed the survey. Of those, 33 youth, or just over 68% accessed the patterns before the show and were therefore able to continue answering questions. From those youth who accessed the patterns beforehand, 93.75% practiced the patterns before the show. Youth reported a preference for patterns posted in advance of the show, with 84.38% indicating they "very much so" preferred early access. Many youth typically practice patterns in preparation for horse shows and they also felt that they performed better in the 2012 State 4-H Horse Show because of having advanced access to the patterns. Thus, the general attitude of youth towards accessing patterns in advance of the State Horse Show was positive. These findings of positive attitudes towards accessing horse-related information online are similar to (Denniston and Callahan, 2005) who found that people who accessed information online felt more in touch with 4-H and informed.

In an attempt to assess specific emotions or consequences regarding access to patterns, a series of more specific questions were asked. When asked if early access to patterns was harmful (1), or helpful (5), over 90% of youth selected 5 on a scale of 1-5. Table 1 demonstrated the distribution of responses when youth were asked to rank their level of anxiety, stress, comfort and fun at the horse show in relation to accessing the

patterns early on a scale of 1-5, with 1 being minimized and 5 maximized. Over 60% of youth replied with a 1 or 2 (indicating general minimization) when asked how they thought their stress and anxiety levels were impacted with early access. Fifty-six percent of youth selected a 4 or 5 in response to patterns affecting their comfort level at the show, with 21% remaining neutral. Ability for youth to have fun at the show was modestly impacted with 63% of youth responding with a 4 or 5 (representing a maximization of fun). Based on these data, horse show patterns should be posted in advance of a youth horse show in order to reduce negative indicators such as stress and to increase positive indicators, such as fun and comfort.

Learning and performance are also important pillars of a youth event. Access to horse show patterns maximized the perceived ability of youth to learn the patterns and yielded a positive impact on their ability to perform during the show (Table 2). The fact that youth felt their ability to learn the pattern was maximized is paramount for this type of youth event.

Eighty-four percent of youth responded with a 4 or 5 (1=no, 5=very much so) when asked if they preferred to receive patterns prior to the show. Beginners and Juniors placed more importance on receiving patterns in advance than Seniors ($P < 0.02$). When asked if youth believed they performed better, about their ability to learn the patterns and how patterns affected their ability to show, 78, 90 and 80% of youth, respectively, responded with a 4 or 5, indicating these parameters were positively impacted. Thus, early access to horse show patterns maximizes how youth feel they were able to perform on these important learning outcomes. The fact that youth believed their ability to learn and to perform was improved with advanced access to patterns is likened to improved performance on exams for graduate students who had access to exam questions in advance of examinations (Brye et al., 2005).

Age of youth did not greatly impact these survey responses. No differences existed between Beginners, Juniors, or Seniors in response to how access to the patterns affected performance ($P > 0.9$), anxiety ($P > 0.19$), comfort ($P > 0.53$), stress ($P > 0.17$), fun ($P > 0.26$), ability to learn patterns ($P > 0.29$), or ability to show their horse ($P > 0.17$) existed. Therefore, while Seniors placed less importance on having access to patterns, their responses to how access affected them was no different than the other age groups.

Table 2. Pattern access preferences of youth and perceived effects on performance.

	Frequency of Response (%)						
Question	1	2	3	4	5		N
Do you prefer to have patterns posted several days in advance of the show?§	6.25	0.00	9.38	0	84.35	*	32
Do you feel that your performed better this year as a result of having the patterns ahead of time?§	3.13	0.00	19.75	28.13	50.00		32
How did access to the patterns affect your ability to learn the patterns?#	0.00	0.00	9.68	22.58	67.74		31
How did access to the patterns affect your ability to show your horse?#	6.45	6.45	6.45	45.16	35.48		31

* Beginners and Juniors reported a greater preference for accessing patterns in advance than Seniors ($P < 0.02$).

§Responses based on a scale of 1-5 (1=no, 3= neutral, 5=very much so).

#Responses based on a scale of 1-5 (1=minimized, 3=neutral, 5= maximized).

Table 3. Adult assessment of pattern access on youth learning and performance.

	Frequency of Response (%)					
Question	1	2	3	4	5	N
Was having access to the patterns hurtful or helpful to your child?^	0.00	1.49	8.96	4.48	85.07	67
Do you feel like your child performed better this year because of having patterns ahead of time?§	1.41	1.41	22.54	33.80	40.85	71
How did access to the patterns affect your child's ability to learn the patterns?#	1.43	1.43	12.86	25.71	58.57	70

^Responses based on a scale of 1-5 (1=hurtful, 3= neutral, 5=helpful).

§Responses based on a scale of 1-5 (1=not so much, 3= neutral, 5=very much so).

#Responses based on a scale of 1-5 (1=minimized, 3=neutral, 5= maximized).

Table 4. Adult assessment how access to patterns affected themselves and their children.

	Frequency of Response (%)						
Question	1	2	3	4	5	P-value	N
How did access to the patterns affect your child's anxiety level?#	47.14	12.86	35.71	2.86	1.43	0.81	70
How did access to the patterns affect your anxiety level?#	44.12	17.65	29.41	5.88	2.94		68
How did access to the patterns affect your child's stress level?#	38.24	17.65	36.67	5.88	1.47	0.71	68
How did access to the patterns affect your stress level?#	33.82	20.59	39.71	4.41	1.47		68
How did access to the patterns affect your child's comfort level?#	1.43	4.29	30.00	20.00	44.29	0.052	70
How did access to the patterns affect your comfort level?#	4.29	4.29	32.86	28.57	30.00		70
How did access to the patterns affect your child's level of fun at the show?#	0.00	0.00	44.29	30.00	25.71	0.63	70
How did access to the patterns affect your level of fun at the show?#	0.00	1.45	44.93	30.43	23.19		69

#Responses based on a scale of 1-5 (1=minimized, 3=neutral, 5= maximized)

Adult Survey

One hundred thirty-two adults completed the survey, including 85 parents, 28 leaders, 11 Extension employees and eight volunteers, advisors, or horse council members. Adults reported 76.29% of their youth accessed the patterns, with 97% of those practicing before arrival at the show. Adults corroborated the youth responses by indicating that youth in fact typically practice patterns before horse shows. Eighty-nine percent of adults responded with a 4 or 5 when asked if access to patterns was hurtful (1) or helpful (5) to their child, indicating a belief that accessing patterns was helpful to their children. From the adult's perspective, youth's ability to not only learn (84% responded with 4 or 5), but also to perform the patterns (74% responded with 4 or 5) was maximized by having prior availability of patterns.

Adults were additionally asked to respond to a similar series of questions, first regarding how they perceived access to affect their youth and second how access affected them (Tables 3 and 4). Adults responded similarly (P = 0.81) to youth regarding anxiety and stress (P = 0.71) being reduced and ability to have fun at the show (P = 0.63). However, adults tended to perceive the comfort level of the youth (64% of responses were 4 or 5; 1=comfort was minimized and 5 = comfort was maximized), to have been maximized more than their own (58% of responses were 4 or 5; P<0.052).

The survey respondents included 48 youth and 132 adults. Sixty-four percent of the adult responses were submitted by parents with the remainder of responses provided by leaders, volunteers and Extension employees. Surveys were distributed to email contacts provided by each family when enrolling in the State Horse Show. Some parents may have asked their kids to fill out the survey while others may have responded themselves on behalf of the family. Regardless of who responded, the message provided by youth and adults is consistent. An overwhelming majority of both youth (98%) and adults (95%) prefer early access to horse show patterns in the future.

Summary

Providing access to horse show patterns in advance of a youth horse show may have many benefits to everyone involved. Youth are faced with a myriad of responsibilities on show day including feeding, grooming and exercising of the horse, ensuring proper appointments of both horse and self, knowing when to be prepared ring-side and finally the pressure to perform publically. In addition, with the pressure of learning a pattern only hours in advance of the performance and the participants are now faced with additional stress. Access to patterns allows youth time to learn and practice patterns they will be tested on in the time and fashion best suited to them and also for reflection in the days leading up to a horse show. While a direct side-by-side comparison of offering early or late access to patterns was not completed in the current study, both youth and adults responded positively to early access indicating perceived benefits for the show experience, learning and performance in youth.

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Student Perceptions of Animal Use in Society

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Abstract

The purpose of this study was to determine the demographic characteristics that affect students' attitudes regarding animal use. Incoming freshman (n = 136) completed a 20-question survey (Likert scale 1–5; range 20–100, summed and reported as a composite score) regarding perceptions of animal use, rights and welfare. Composite scores (CS) ranged from 54.8 to 81. Lower scores were consistent with animal rights positions and higher scores corresponded with animal use values. Composite scores were examined for correlation to varied student demographics. Major ($P < 0.01$); career objective ($P < 0.01$), geographical region ($P < 0.05$) and history of animal ownership ($P < 0.01$) significantly affected CS. Livestock science majors (70.1 ± 1.1) scored higher than either equine (57.7 ± 1.3) or horticulture majors (57.9 ± 1.4). Students with livestock production career objectives scored higher (69.5 ± 1.6) than students interested in either equine production (61.5 ± 2.5) or veterinary medicine (61.2 ± 1.6). Commercial livestock ownership, reported by 39.9% of students, dramatically increased ($P < 0.01$) CS compared with students reporting equine, pet or no animal ownership. As part of the survey, students were asked if they perceived a difference between animal rights and welfare. Gender ($P < 0.05$), age ($P < 0.05$) and home residence ($P < 0.01$) all significantly influenced responses. Males, non-traditional students (age >21) and urban dwellers were less likely to differentiate between animal rights and welfare than females, 17–20 year olds and students from non-urban backgrounds. This study indicates most students CS are consistent with supporting animal welfare and use.

Introduction

Historically in the United States, animal welfare involved those activities that provided adequate water, food and shelter to animals in a pain and stress free environment. Recently, there have been numerous studies that expand the definition of adequate welfare to include husbandry conditions that insure species-typical behaviors, species-typical social interactions and the ability to adapt and cope with their environment (Swanson, 1995; Miranda-de la Lamal, et al 2010; Morrison, et al 2006; Rose-Meierhofer, et al. 2010; Shimmura, et al 2010). Political animal activism has become widespread, often challenging current livestock and non-livestock animal husbandry practices and in some instances has resulted in legislative changes designed to regulate animal welfare. Current social, political and economic environments contribute to the divergent views of animal use in our society. Recent studies have examined factors that influence attitudes towards animal rights and welfare. Demographic factors, such as gender (Heleski, et al 2004; Paul and Podberscek, 2000) and residence (Kelbert and Berry, 1980; Reading, et al 1999) have been shown to influence attitudes. Additionally, Smith and Mackie (2000) attribute cognitive dissonance as a psychological mechanism that individuals use to alter attitudes to match behaviors. Speciesism, the discrimination or differences in values based solely on species, increases the complexity of understanding and predicting individual's and society's attitudes towards animals (Serpell, 2004, Taylor and Signal, 2009). The objective of this study was to characterize general attitudes on animal use by society in freshmen undergraduates and correlate general attitudes with demographic parameters.

Materials and Methods

Questionnaire

A review of several previous survey instruments was conducted. The survey instrument designed by Davey (2006) was selected, due to its brevity, ease of administration and was modified for use in this study. Briefly the survey consisted of 20 questions designed to measure students' attitudes toward the use of animals in society, Figure 1. Animal use topic questions included: food and production methods (n = 4), sport (n = 3), medical use (n = 3), transportation (n = 1), fur (n = 1), threats or pest (n = 1), companion animals (n = 3) and general animal rights (n = 4). Modifications included slight wording changes as well as replacing 5 topics from the Davey survey instrument with questions that reflected United States agriculture, Ohio culture and current animal welfare issues. Each question was scored on a 1-5 Likert scale using descriptors such as 1 = strongly dis-

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agree to 5 strong agree. Seven questions were reverse scored so that they consistently reflected the same attitude at the extreme ends of the Likert scale. This created a scoring system that could range from 20, reflecting individuals with extreme animal right views, to 100, reflecting individuals with extreme animal use and anthropocentric views. Twelve demographic questions were included as part of the survey instrument. These included: gender, age, income, residence type, state of residence, major, career goal, previous animal ownership and involvement in agricultural, community and animal service organizations.

Figure 1. Survey instrument designed to determine student perceptions of animal use and corresponding average Likert scores.

1. Fencing in animals, even domesticated ones, is inhumane.	4.21
2. The production of inexpensive meat, eggs, and dairy products justifies maintaining animals in intensive confinement facilities, i.e. caged layers, gestation crates etc.	2.71
3. redatory carnivores (such as bears, wolves) that threaten humans or livestock should be eliminated.	2.4
4. There is nothing morally wrong with hunting wild animals for food.	4.35
5. Breeding animals for their skins or trapping wild animals for their skins is a legitimate use of animals.	2.67
6. It is acceptable to keep downer animals (animals that cannot stand) if there is a marginal chance of a full recovery.	3.04
7. It is acceptable for humans to practice speciesism (the discrimination between animals based on species), i.e. the value of the life of one animal is worth more than that of another.	2.46
8. The Amish community should be able to use their horses for draft and transportation.	4.19
9. It is morally wrong to hunt wild animals just for sport.	3.38
10. It is acceptable to keep the family dog chained in the back yard alone.	2.57
11. Testing the safety of cosmetics on rabbits is unnecessary and should be stopped.	2.41
12. There should be extremely stiff penalties, including jail sentences, for people who participate in cock- or dog-fighting.	1.58
13. It is unethical to breed purebred dogs for pets when millions of dogs are killed in animal shelters yearly.	3.19
14. It is acceptable to raise genetically engineered animals for xenographic organ/tissue transplantation (i.e. organ/tissue transplants from pigs to humans).	3.2
15. It is acceptable for humans to manage sustainable wild animal populations rather than allowing survival of the fittest.	3.43
16. Continued research with animals will be necessary if we are to ever conquer diseases such as cancer, heart disease, and AIDS.	3.54
17. It is wrong to construct fences that interfere with the natural migratory patterns of animals such as elk, deer etc.	2.9
18. Mandatory spay – neuter laws for companion animals are unethical.	2.46
19. I think people who object to raising animals for meat are too sentimental.	3.48
20. It is morally wrong to own animals.	4.9

Participants and Procedures

The Institute Research Board approved our survey and we obtained instructor permission to administer the questionnaire to students enrolled in four introductory classes at Ohio State University ATI, Wooster, Ohio in August, 2011. Inclusionary courses were Introduction to Horse Science, Introduction to Animal Science, Commercial and Floral Design, Exploring Horticulture and Introduction to Turfgrass Management representing students with equine (n = 40), livestock (n = 58) and horticulture (n = 38) interests. On the testing date, the survey proctor went to each classroom and gave a brief description of the survey, emphasizing that participation was voluntary and answers were confidential.

Analysis

Data were entered into an Excel® spreadsheet. Data from reverse scored questions were entered on the spread sheet as it's numerical opposite (ex. Likert score of 1 was entered as a 5) and composite scores were calculated as the sum of Likert scores for questions 1-20. Correlation analysis (Pearson) was performed between demographic main effects (gender, region, income, major, career objectives, animal ownership and involvement in agricultural, community and service groups) and composite score using least square means. Chi-Square tests were used to analyze the differences between 'yes' or 'no' answers to the question, "Is there a difference between animal rights and animal welfare' and the main, independent demographic values?" Significance was reported at $p < 0.05$ and trends were reported at $p < 0.10$ level. All statistics were performed using Mixed Model SAS (SAS Institute, 2002).

Results and Discussion

Demographic information indicated that females comprised 61.8% of survey participants compared to 38.2% male. In-state residents (Ohio) predominated, accounting for 94% of those surveyed compared to only 6% of out-of-state students. More in-state students were from the northeast region of Ohio (48.8%) compared to the northwest (18.25%), southeast (18.25%) and southwest (14.29%) regions. The larger number of students from the northeast is most likely attributable to the presence of several larger metropolitan areas (Cleveland and Akron-Canton) as well as being the region in closest proximity to campus. Also, as expected in introductory courses, 54.4% and 29.4% of the students were 17-18 and 19-20 years of age respectively. Only 6.5% of the participants were over 25 years of age. The primary reported residence type was farm (41.9%) followed by rural, non-farm (25.7%), suburban (16.9%) and urban (15.5%).

The most common major among survey participants was livestock science/livestock production (39.39%), followed by equine science/horse production (28.03%) and horticulture science (24.24%). Agricultural engineering, business, crop production, pre-veterinary science and undecided majors made up the remaining 8.34%. Within the animal related majors, 40.66% indicated pre-veterinarian/veterinary career ambitions, 37.36% indicated that they were planning on going into animal production or management fields, 16.48% specifically indicated equine production while only 4.4% reported a science or research interest. Somewhat surprisingly, 19.63% of the students surveyed reported household incomes less than $30,000 per year. Annual household incomes between $50,000-75,000 were the most common (29.91%) while incomes between $30,000-50,000 and $75,000-100,000 were reported 20.56 and 21.5% of the time respectively. The vast majority (72.06%) of surveyed students reported that

Table 1. Frequency distribution of animal ownership and corresponding animal use survey composite score. Letters indicate statistically significant differences (p < 0.01).

Animal Ownership	Percent of surveyed population	Composite Score (Possible range 20-100)
Pet (traditional or non-traditional)	33.33	58.77
All (commercial livestock, show livestock, horse, pet)	17.04	67.50
Pet, Show livestock, Commercial livestock	14.81	65.55
Pet, Horse	11.11	54.85
Pet, Horse, Show livestock	9.63	66.15
Pet, Show livestock	4.44	60.67
Pet, Horse, Commercial livestock	2.97	62.50
Pet, Commercial livestock	2.22	74.00
Show livestock, Commercial livestock	2.22	72.67
None	1.48	60.50
Commercial livestock	0.75	81.00
	Total 100.00	Mean Average 62.77
Commercial Livestock Ownership		
Animal Ownership including commercial livestock	40.01	67.29[a]
Animal Ownership excluding commercial livestock	59.99	59.72[b]

they had been involved in an agricultural related group or organization while 89.71% reported past involvement in community service, however, only 41.18% surveyed had been involved in community service involving animals (ex. humane society). The vast majority of students surveyed reported current or previous animal ownership. Only 1.48% of those surveyed had never owned an animal. Table 1 depicts the frequency, type of animal ownership and composite score based on animal ownership.

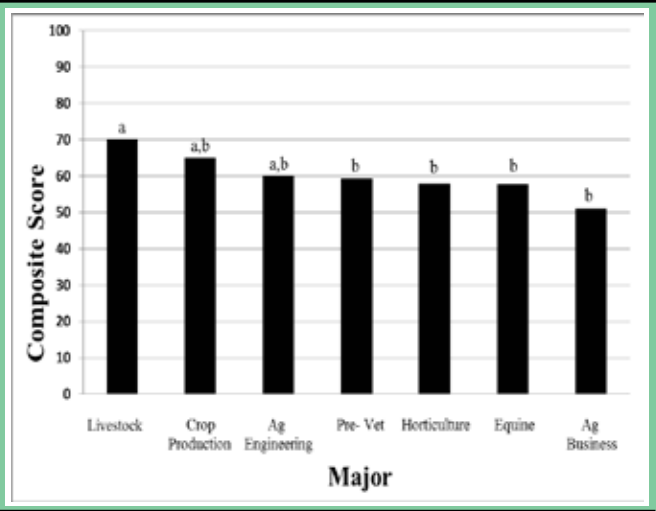
Composite scores (CS), the sum of Likert scored questions 1-20, ranged from 54.8 to 81 with an overall survey average of 62.77. Composite scores were examined for correlation to student demographics. Major ($P < 0.01$); career objective ($P < 0.01$); region of Ohio ($P < 0.05$) and history of animal ownership ($P < 0.01$) were significantly correlated with CS. Livestock science majors (70.1 + 1.1) scored statistically higher (than either equine (57.7 + 1.3, $P < 0.01$) or horticulture majors (57.9 + 1.4, $P < 0.01$) Figure 2. Similarly, students that indicated they had animal production career objectives scored higher (69.5 + 1.6, $P < 0.01$) than students interested in either equine production (61.5 + 2.5) or veterinary medicine (61.2 + 1.6), but no differences were observed between other paired career contrasts. Animal ownership (commercial livestock, show livestock, equine, pets and all possible combinations) was analyzed and significantly effected CS. Commercial livestock ownership, reported by 39.9% of students, dramatically increased ($P < 0.01$) CS compared with students reporting equine, pet or no animal ownership. Of the 68 comparisons between the combinations of reported animal ownership, there were 14 comparisons that had significantly higher CS ($P < 0.05$) and they all involved some combination that included commercial livestock. Additionally, students from NE Ohio had lower CS than students from SE Ohio, likely due to the increased urban population of the region. Composite scores were higher ($P < 0.01$) for students that reported involvement in agricultural organizations (64.9 vs. 57.1) and community service ($P < 0.01$; 63.6 vs. 55.6) compared to those who had not participated in these activities. In contrast, CS were lower ($P < 0.05$) in the group of students that reported involvement in animal service groups (60.1) compared to those not involved (64.9), perhaps reflecting a higher level of empathy towards animals due to their past experiences. Surprisingly, income and age were the only demographic characteristics that did not appear to show any correlation with CS.

As part of the survey, students were asked if they perceived a difference between animal rights and welfare, Figure 3. Gender ($P < 0.05$), age ($P < 0.05$) and home residence ($P < 0.01$) all significantly influenced responses. Males, non-traditional students (age >21) and urban dwellers were less likely to differentiate between animal rights and welfare compared to females, 17–20 year olds and students from non-urban backgrounds (farm, rural, suburban), respectively. There was a trend ($p = 0.10$) for students from households reporting annual income less than $30,000 to be less likely to recognize a difference between rights and welfare.

The demographic characteristics that influenced CS in our study paralleled findings from other researchers. Numerous studies have revealed that females appear to be more empathetic and consistently score higher on 'animal attitude' surveys than their male counterparts (Hazel et al., 2011; Taylor and Signal, 2009; Herzog, 2007; Heleski et al., 2005). Similar to our study, Hazel and associates (2011) reported lower animal attitude scores in students that expressed career choices in the livestock industry. These differences in animal attitude scores may be influenced by a variety of factors including: values; norms; knowledge; and economic, social and moral interests (Te Velde, et al., 2002).

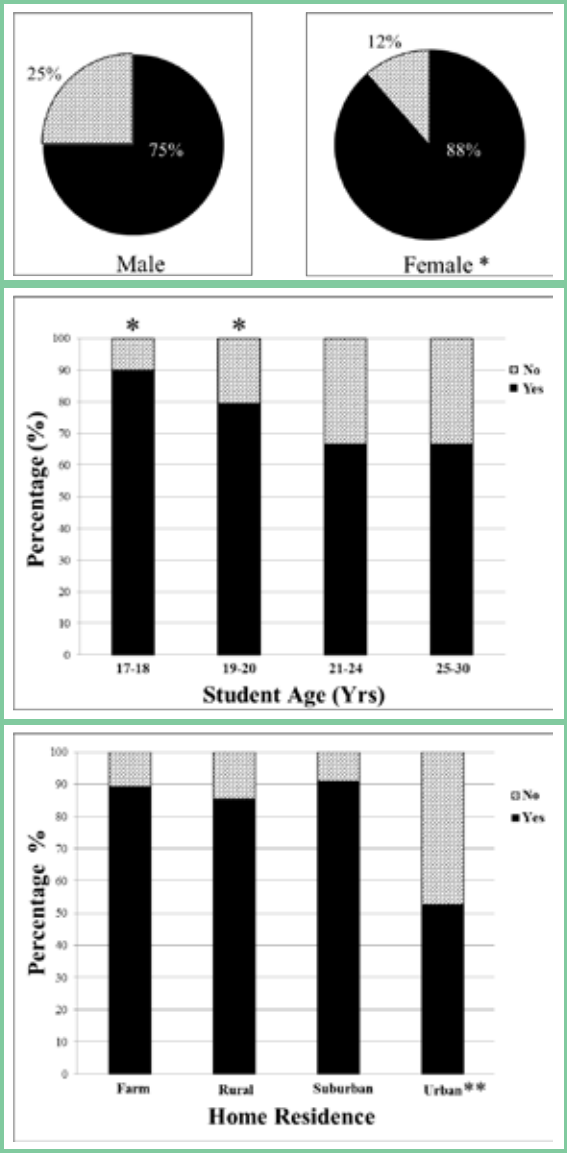
The intensification of animal agriculture and disconnect from the farm that most citizens in today's

Figure 2. Relationship of selected major on animal use composite score.



Letters indicate statistically significant differences for (p < 0.01).

Figure 3. Demographic factors influencing freshmen students' self-reported differentiation of animal rights and animal welfare.



Asterisks indicate statistically significant differences (*) for ($p < 0.05$) and (**) for ($p < 0.01$).

society experience probably account for much of the discordance that appears to exist between the agricultural and non-agricultural segments of a society. Citizens in Belgium evaluated the current state of farm animal welfare as problematic whereas farmers in Belgium reported satisfaction with farm animal welfare. An extensive, quantitative study categorized the discourse of farm animal welfare between citizens and farmers as those involving an animal's ability to engage in natural behaviors and those related to pain and stress (Vanhonacker et al., 2008). The cause of this discourse needs to be explored. One possible explanation is that scientific knowledge about animal physiology, behavior, adaptation and the practice of scientific objectivity allows industry workers to shape their values using first-hand observations and objective reasoning compared to those who rely on information from mass media sources, which can often harbor hidden bias. An alternate explanation involves the psychological principle of cognitive dissonance, which was first proposed by Festinger in 1957. Simply stated, "*inconsistency between attitudes and behaviors will elicit an aversive state in an individual and the underlying inconsistency will affectively change attitudes in order to maintain a state of consonance*" (Festinger, 1957). Later research by Mauer, et al. has shown that the theory of cognitive dissonance is not as strong of a core motivation as first postulated. Mauer (2006) correlated low course/instructor evaluations with low grade expectations and attributed this positive correlation with cognitive dissonance. In contrast, cognitive dissonance did not appear to explain the disparity in high school student attitudes and behaviors regarding cheating (Vinski and Tryon, 2009). In the present study, students expressed the strongest disagreement to the statements, "Fencing in animals, even domestic ones, is inhumane" and "It is morally wrong to own animals." Granted, both statements express strong animal rights views. However, based on animal ownership information, the overwhelming majority of survey participants have apparently done both, thus, lending support to the theory of cognitive dissonance. Further evidence that cognitive dissonance may play a role in shaping attitudes towards animals was the strong support that 'there should be stiff penalties for cock or dog fighting' since it is unlikely that undergraduate college students actively participate in those activities and society commonly views such activities as morally wrong. Additionally, students in our study also strongly supported 'hunting wild animals for food', a practice that is common in agricultural and rural communities in Ohio. Evidence, from our study, opposing the cognitive dissonance theory was the strong agreement with the statement, "The Amish community should be able to use their horses for draft and transportation". It is a foregone conclusion that survey participates were not Amish since the Amish do not believe in higher education. However, the use of horses for transportation may not be as psychologically unpleasant as practices that result in the suffering and/or death of animals, therefore being morally acceptable to individuals.

Another major factor that influences people's perceptions of animals in society is their stance on speciesism. The term, speciesism, is fairly new, however the idea that different species of animals are given different values, rights and considerations by humans is quite old. Students in our study disagreed (2.44 out 1-5 Likert scale) with the statement "It is acceptable for humans to practice speciesism." In perspective, this statement had the third lowest score in the 20 question survey. Clearly, students believe that it is morally and ethically wrong to show prejudices and discriminations. This may be largely due to mass and social media and the prevalence of "political correctness" threaded throughout today's society. However, recent research suggests significant differences in attitudes towards the treatment of animals depending solely on their species. Sims, et al., (2007) found that when assessing punishments for acts of animal cruelty, people were more interested in

knowing the species of animal involved rather than the type or circumstances of the crime. Additionally, Taylor and Signal (2009) developed a survey instrument (PPP) which was specifically designed to isolate the attitude differences people had between species types (pet, pest and profit species). Participants had significantly different attitude scores based on species category (pet species > pest species > profit species). A similar trend was observed in undergraduate college students where attitude scores showing empathy towards animals were highest for pet species followed by pest species and profit species (Hazel, et al, 2011). The schism in attitude towards speciesism between our study and other studies may be explained by the difference in survey groups, or it may demonstrate a social stigmatism created by the word speciesism compared to data derived from general survey questions without the negative label.

Summary

There are a plethora of views and attitudes towards animals and their appropriate usage. An individual's gender, life experiences and social status clearly play a role in shaping an individual's perceptions of proper animal care, use and treatment by society. An academic understanding of the difference between 'animal welfare' and 'animals rights' is important to all citizens, particularly as politically motivated animal rights groups, such as PETA (People for the Ethical Treatment of Animals) and HSUS (Human Society of the United States) continue to increase their influence and expand their marketing and political campaigns across the nation. Results of this study indicate that some demographic factors are positively correlated with the ability to differentiate between animal rights and animal welfare. Education and past experiences most likely explain these differences, which may not be present in a more diverse population. Animal agricultural industries appear to do an acceptable job educating internal stakeholders. More research is needed to evaluate their educational impact on external stake holders.

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Engaging Student Teachers in Designing Ecopedagogy Learning Modules for Bali's Subak Cultural Landscape

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Abstract

We assessed learning modules designed by student teachers for a contextual biology learning course to address three principles of ecopedagogy: ecological, cultural and technological literacy. An active-learning course was planned, implemented and evaluated using Bali's subak heritage as an example of place-based education. Students were encouraged to apply the principles of ecopedagogy to the design of the learning modules. We describe how teaching modules created by teams of students were proposed, developed, critiqued and gradually improved. The final version of the modules were assessed with a four scale rubric: 4 (exceptional), 3 (admirable), 2 (acceptable) and 1 (amateur). Statistical analysis showed significant improvement (P=0.001) in students' module design ability, mainly evidenced by the higher distribution of exceptional, admirable and acceptable scores in the final module compared with those in the drafts. This study provides an example of how student engagement in designing learning materials can serve two purposes: improving their understanding of the subject matter (cultural heritage) and also their pedagogical skills through interactive learning.

Introduction

Engaging student teachers in designing learning modules based on ecopedagogy can be an effective way to prepare them for understanding the core value of future education: sustainability. Several authorities (Arbuthnott, 2009; Kuhlman and Farrington, 2010; Siteinei and Morrish, 2014) noted that sustainability is concerned with the well-being of future generations and preservation of the foods, agriculture, natural resources and environment. Thus, "*sustainability is not a goal but an endless process of constant implementation, assessment and readjustment*" (Klahr, 2012, p.20).

Ecopedagogy refers to the branch of pedagogy in which education is practiced based on sustainability (Gadotti, 2010). It "*facilitates understanding of sustainable living by teaching the basic principles of ecology and a profound respect for living nature, through experiential, participatory and multidisciplinary approaches*" (Capra, 2005, p.xiv). Richard Kahn (2010) describes four priorities in the ecopedagogy movement, namely the deepening of understanding of new possibilities for convivial life, the building of praxis between scholars and the public, critical dialogue and self-reflective solidarity across a multitude of groups and considerations of traditional ecological knowledge as a science.

Future teachers need to be inspired to develop their capacity for designing and evaluating ecopedagogy materials. For one group of student teachers, inspiration came from Bali's subak cultural landscape. The subak is a traditional, community-level religious institution for managing irrigation water. It is well adapted to and embedded in, the characteristics of the Balinese landscape (Roth, 2011). It is also a meeting ground between cultural ecology, scientific exploration, political dialogue, community stewardship and the study of nature (Lansing and Miller, 2003; Sobel, 2004). Subaks thus present a remarkable case study for modeling a specific learning context, particular attributes of place, multidisciplinary approaches, self-community connection and spurring the students towards out-of-the box thinking (Cramer, 2008; Martin, 2006).

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Using subaks to introduce students to the design and evaluation of ecopedagogy modules will put them at the center of the learning process, enhance their motivation to learn, integrate various teaching strategies, improve their knowledge and skills and provide a rewarding experience (Cohen et al., 2004). Through this, students have the opportunity to develop their potential to initiate and achieve higher-order thinking required for decision-making and problem solving. As an authentic assessment exercise, designing learning activities that combine ecopedagogy and an inquiry-based model enhances student learning and prepares researchers for their future roles, whether as scientists or informed citizens (Hui-Min Chung and Behan, 2010). Such assessment can also foster the integration of theory, actions, assessment, group learning and educational outcomes (Fitch et al., 2008). Last, it offers a perfect opportunity to meet conservation goals while reconnecting with the land and providing citizens with the skills necessary to continue protecting the cultural landscape in the future (Cramer, 2008).

Materials and Methods

This study was conducted from August 2013 to February 2014 during a semester-long Contextual Biology Learning (CBL) course at the Mahasaraswati Denpasar University Indonesia, with an enrollment of 34 undergraduate student teachers. The course was designed to cover three principles of ecopedagogy: ecological, cultural and technological literacy. Ecological literacy was defined as the ability of students to insert ecological concepts, such as ecosystems, biogeochemical cycles and biodiversity, into the design of learning modules; while cultural literacy referred to their ability to provide an example of contextually relevant culture (e.g., rice culture) in their modules. Finally, technological literacy was taken as students' competency to use modern technology – for example mobile phones – as a set of learning tools. The objective of the CBL was for student teachers to apply ecopedagogy principles in the design and evaluation of subak-based learning modules. In addition to disseminating environmental information, CBLs also encourage future teachers to produce new knowledge and seek out new education paradigms. In ecopedagogy, CBL "takes into account people, cultures, lifestyles and the respect towards identity and diversity" (Gadotti, 2008, p.18).

Table 1 shown, most of the course relied on active learning strategies in two phases of class presentations and discussion to produce a draft module (Phase 1) and final module (Phase 2). During these phases students worked in turn as reporters, moderators, note takers, evaluators and participants. Reporters described the progress of their draft module; moderators facilitated class discussion; note takers recorded the key points; evaluators assessed class performance; and participants provided feedback in the form of questions, suggestions and assessments. In addition to classroom activities, we also held a 3-day field trip for students to visit two sites in the Balinese Subak Cultural Landscape. During the journey, students observed and learned about the landscape of subaks, held discussions and interviewed farmers and local leaders. This provided an opportunity for experiential learning by connecting students to the community and focused on specific ecological locations and cultural and technological characteristics. We assessed learning module twice, using a scoring rubric at the end of both Phase 1 and Phase 2. The rubric was adapted from several sources, but was drawn mainly from Parks (2012). It consisted of four grades: exceptional (4), admirable (3), acceptable (2) and amateur (1). The rubric also contained nine criteria describing the performance conditions for a successful module:

1. Organization of the module materials using headings or subheadings to group-related material
2. Appropriateness level of the topic
3. Interest of the module to the reader
4. Suitable use of learning strategies
5. Originality of instructional materials
6. Compliance with the school curriculum
7. Appropriateness level of learning objectives to students' behavior and understanding
8. Achievement of learning competencies
9. Citations of library resources

To score modules, we followed the method of Powell and Wells (2002), in which scores were determined by the author and an additional assessor scoring each module independently, comparing module scores and discussing discrepancies and inconsistencies. Quantitative data were analyzed both descriptively and statistically. A Wilcoxon-paired test was used to detect significant differences in rubric scores between draft and final modules, which were determined according to $P<0.05$ unless otherwise noted.

Results and Discussion

A total number of 34 students designed modules. All modules were based on ecopedagogy, which appeared

Table 1. Classroom Activities in the Contextual Biology Learning Course

Meeting	Content	Activities
1st	Introduction	The instructor described the scope and objective of the course, inquiry learning, ecopedagogy, the *subak* landscape, and place-based learning.
2nd	Module development	The instructor outlined the definition, benefits, and procedure for preparing and assessing a module; question and answer session.
3rd –7th	Phase 1 class presentations & discussion	Using PowerPoint, 4–5 students presented their ideas (10 min); question and answer session (10 min); note-taking and evaluator reports (5 min); instructor comments (5 min).
8th	Draft module assessment	Students conducted self and peer-review of module drafts using the assessment rubric.
9th	General review	The instructor led a general evaluation, focusing on points in need of correction in the module drafts & how to use the assessment rubric for review.
10–15th	Phase 2 class presentations & discussion	Similar to Phase 1.
16th	Final module assessment	Similar to the draft module assessment.

Table 2. Assessment Comparison between Draft and Final Modules of Student Teachers: Presentations According to the Rubric Criteria

Rubric criteria	Draft module (% of students scoring in each grading category; n=34)				Final module (% of students scoring in each grading category; n=34)				Sig.
	Exc. (4)	Adm. (3)	Acc. (2)	Amt. (1)	Exc. (4)	Adm. (3)	Acc. (2)	Amt. (1)	
1. Organization of module materials.	5.9	44.1	38.2	11.8	23.5	59.2	23.5	0.0	***
2. Appropriate level of the topic.	5.9	32.4	47.1	14.7	25.3	35.4	41.2	0.0	***
3. Interest to the reader.	2.9	29.4	47.1	20.6	14.7	44.1	41.2	0.0	***
4. Suitable use of learning strategies.	0.0	17.6	32.4	50.0	5.9	35.3	35.3	23.5	**
5. Originality of instructional materials.	2.9	35.3	41.2	20.6	14.7	35.3	50.0	0.0	***
6. Compliance with the school curriculum.	0.0	14.7	38.2	47.1	0.0	41.2	52.9	5.9	***
7. Appropriate level of learning objectives.	0.0	29.4	35.3	35.3	0.0	55.9	38.2	5.9	***
8. Achievement of learning competencies.	0.0	26.5	32.4	41.2	0.0	38.2	55.9	5.9	***
9. Citations of library resources.	0.0	5.9	20.6	73.5	0.0	8.8	47.1	44.1	*

Exc. (Exceptional), Adm. (Admirable), Acc. (Acceptable), Amt. (Amateur); *, **, *** Significant at P=0.05, 0.01 and 0.001, respectively using A Wilcoxon-paired test.

in module topics, content and learning strategies. The most common topic was the ecosystem (24%), followed by biodiversity (21%), waste recycling (18%), pollution (15%), human population (15%) and the biogeochemistry cycle (3%). Ecosystem materials included interaction between living and nonliving components, population and community. Several students tried to explain the relationship between the ecosystem and traditional subak ceremonies, e.g., tumpek uduh (the day Balinese make offerings in reverence of plants, in particular large trees, in the hope that they continue to bear fruit for human consumption), tumpek kandang (the day of ceremony dedicated to animals, especially livestock, in which it is emphasized that people should take care of their animals for the preservation and benefit of life), nangluk merana (a ceremony aiming to protect plants from pests and which provides blessings of fertility) and biukukung (when farmers offer rice paddies in the milk stage as petitions to the Goddess for a good harvest). Some modules described genetic diversity in the subaks, such as various local paddies (e.g., white, red and black paddies), species diversity (both plants and animals) and local ecosystems (e.g., watersheds, mixed farms and gardens). Interestingly, three modules focused on a species of bird, namely the Java Sparrow (Padda oryzivora). Its population has undergone a significant decline and it has become a rare species throughout its natural range as a consequence of intense trapping activity for trade and pesticide/herbicide use (BirdLife International, 2001; Siswowartono, 1996). Another module focused on biodiversity at Batur Global Geopark located around an active volcano in northeast Bali. Global Geoparks are intended to promote awareness of key issues facing society and provide information on the sustainable use of and need for, natural resources (UNESCO, 2014).

The topic of pollution encompassed the causes of soil, water and air pollution. Several modules detailed the pollution that occurs in rice paddy fields (e.g., the effects of plastic waste on irrigation water; death of eels, fish and other aquatic animals due to chemical contamination of irrigation water). Burning straw as a cause of air pollution and the proliferation of weeds due to the excessive use of chemical fertilizers were also mentioned in several modules. Students addressed waste recycling in terms of reducing chemical pesticides, replacing inorganic chemicals with organic ones, reusing agricultural waste for handicrafts and recycling cattle waste as compost. The topic of the biochemistry cycle was addressed through the food chain, food web, ecology pyramids and water and gas cycles. Finally, the topic of human population involved the impact of population density on rice field land conservation, food shortages and environmental pollution.

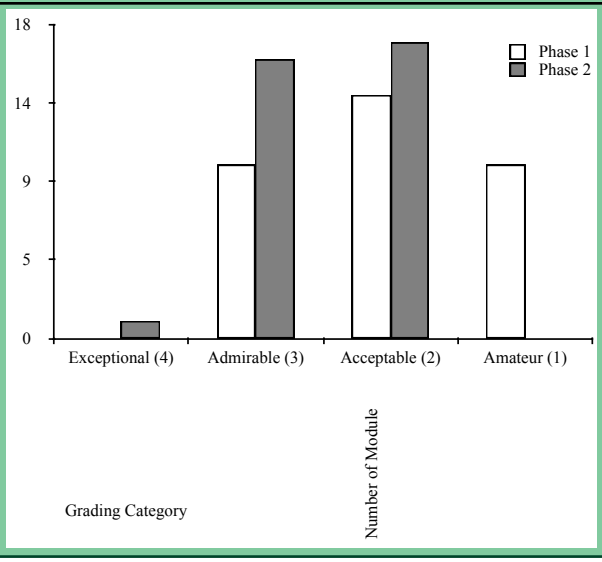
Class Presentations and Discussion

During Phase 1, students were critiqued on the compatibility of their module titles with the proposed content. Some modules only presented learning materials without learning strategies and several mentioned learning approaches but did not describe teacher or student behavior. Time allocated to modules also exceeded the time available in the curriculum. There were also issues related to originality and plagiarism: the content of some modules was similar to one another, while most module drafts cited text or illustrations without references. Evaluation was an important part of the module and included a lively discussion, particularly on how to design test and assessment rubrics. During the general review, the instructor engaged students as problem solvers for their respective modules, encouraging them to search for more references, write concisely and use more examples from the subak landscape. During Phase 2, most of the modules had improved, mainly in terms of organization, learning strategies, time allocation, interest and originality (Table 1). However, several students still encountered obstacles in terms of the consistency of their bibliography with APA Style (6th edition, www.apastyle.org/index.aspx).

Rubric Assessment

The majority of students increased their competency in designing learning modules (Figure1). At the end of Phase 1, half of the module drafts were categorized at the level of “acceptable” and the remainder split equally between “admirable” and “amateur.” However, at the end of Phase 2, none were graded as ‘amateur’ and the number of final modules in the “exceptional,” “admirable” and “acceptable” grades was higher than for the draft versions. Statistical analysis indicated

Fig. 1. Ecopedagogy Module Performance: Comparison of Phase 1 (draft) versus Phase 2 (final) Presentations of Student Teachers.



significant improvement (P=0.001) in the performance of final modules over draft modules.

Nearly all criteria in the assessment rubric, the final modules scored higher than the drafts (Table 2). For example, the percentage of modules scored as "exceptional" in terms of organization, interest, understanding and material was five to six times higher than the drafts. Similarly, the number of final modules scored as "admirable" in terms of originality, curriculum appropriateness, learning objectives and reference list was twice as high as for the draft modules. Unfortunately, the reference list and learning strategy criteria of about half and one-quarter of final modules, respectively, were graded as "amateur." This was because some students had difficulties writing a bibliography of primary sources, which are mainly taken from journals and conference proceedings.

Summary

This study aimed to answer the question: What drives student-teacher engagement in ecopedagogy approaches? The information gathered may help in creating more active learning environments. Our study supports the findings of previous research that engaging students in active learning can integrate alternative methods with traditional ones such as the lecture (Haskett, 2001), enhance student ability to solve novel problems (Cortright et al., 2005), improve course structure, address teaching deficiencies (Hiller and Tyre, 2009) and increase student engagement in learning (Taptamat, 2011).

A unique aspect of this study was to provide future educators with a methodology for designing and evaluating the effectiveness of a place-based education approach. The place in question was a meeting ground of cultural ecology, scientific exploration, political dialogue, community stewardship and the study of nature (Sobel, 2004). Stevenson (2011) adds that place can be a source of ideas and values that shape personal, cultural and professional identity.

The program described in this paper trained student teachers to teach lessons, meet curriculum objectives using the subak landscape as a classroom setting, prepare students to adapt to local conditions and respect and conserve these environmental resources. Our assessment found that applying active learning strategies to the cultural landscape positively influenced student learning, as evidenced by students' increased knowledge, understanding and ability in designing learning materials. This may in turn contribute to positive behavior in students toward subak conservation (Dimopoulos et al, 2008).

Further recommendations based on the findings of this study are (a) the effectiveness of ecopedagogy modules should be confirmed via feedback from students and teachers through active research into learning processes to produce more reliable conclusions. Future research should address to what extent these learning materials hold meaning for students, influence young peoples' learning in relation to critical and complex issues and for the health of the planet (Gadotti, 2010; Rivera and Dann, 2011); (b) educators of student teachers need to empower students to work as active partners and introduce a variety of socially meaningful activities in the learning process. Service learning projects are one of many forms of meaningful learning in which educators can strive to equip students with five transferable skills – communication, commitment, consideration, courage and competence – in leadership (Robinson and Torres, 2007). This will help students to take part in decision-making processes in their own communities and beyond (Savelava et al., 2010); (c) in case ecopedagogy modules were implemented systematically and over an extended period of time, they may eventually contribute to better environmental governance in terms of subak conservation by broadening stakeholder acceptance and involvement at the local level (Dimopoulos, 2008); (d) the education system should be changed into a resource center that initiates and supports students' inclusion in sustainable processes in their own communities. In this case, we should keep in mind that elements of Balinese culture like the subak have historically been important selling points in the Balinese tourist industry (Lorenzen and Lorenzen, 2011). If Bali wants to maintain its deep cultural landscape heritage, local schools should be "agents of change" in encouraging the future generation to work in rice cultivation.

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A Case Study of Flow Theory in Pre-Service Undergraduate Agriculture, Food and Natural Resources Education Students

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Abstract

This case study sought to descriptively explore pre-service undergraduate Agriculture, Food and Natural Resources Education (AFNRE) students' feelings, interest, mood and flow during their daily lives as college students. The purpose of this study was to validate flow theory in pre-service AFNRE students. Experiences of five pre-service undergraduates were assessed with a series of online surveys administered at Michigan State University. Sampling techniques involved a modified signal-contingent Experience Sampling Method using six measurement intervals randomly selected each day. Data were analyzed at the individual interval level (n = 114). Positive relationships between flow experiences and respondents' satisfaction suggest that learning in the context of experiential activities was important to the overall perceived experience by students. There was support that pre-service undergraduate AFNRE students had a significantly higher percentage of flow experiences while participating in an FFA Career Development Event (CDE) activity. Perceived anxiety was a significant proportion of all channels measured (54%). This research implies that AFNRE undergraduates may have positive experiences during experiential activities working with secondary students in instances even when challenge and abilities are exceeded by activities that are taking place during the course of an undergraduates' Land-Grant University experience.

Introduction

It is important for Agriculture, Food and Natural Resources Education (AFNRE) faculty to understand how future teachers learn and what are the optimal conditions for these undergraduates to develop into successful AFNRE teachers. Accordingly, the National Research Council (2009) issued a call for post-secondary curricula and teaching to utilize dynamic approaches to learning for agricultural students. Further, these approaches should leverage experiences that provide students with "real-world" interpretation of ideas, concepts and skills that will in turn create learners who are successful in their future careers. One theory that has potential to help foster these dynamic approaches is the psychological concept of flow.

Flow Theory or "flow" is defined as "the holistic sensation that people feel when they act with total involvement" (Csikszentmihalyi, 1975, p.36). Csikszentmihalyi (1975) originally identified four components that comprise flow including: 1) control of the experience; 2) attention during the experience; 3) curiosity about the experience; and 4) an intrinsic interest to perform the experience. Occurrences of flow are also defined as optimal experiences. Shernoff et al. (2003) have further defined flow theory as a symbiotic relationship between challenges and skills to meet a particular task. For example, in the instance of college students (Asakawa, 2010; Asakawa, 2004; Rogatko, 2009) and high school students (Bassi and Delle Fave, 2004; Shernoff et al., 2003) as ways to understand perceived enjoyment, interest and concentration levels of individuals during specific activities. Asakawa's research aimed at determining if college students' flow experiences led to individuals that do things for their own sake or are intrinsically motivated in their tasks (2010).

Drawing on the theoretical and empirical literature, this case study attempts to explore undergraduate pre-service AFNRE students' feelings, interest, mood and flow in their daily lives as college students in an effort to better understand opportunities when students are involved and enjoying every day experiences and how this knowledge can be leveraged to improve classroom learning. Although the context for this exploratory research is with AFNRE students, previous research suggests that the application of flow theory can be applied to additional post-secondary settings (Asakawa, 2010; Asakawa, 2004; Rogatko, 2009). Therefore, we believe this exploratory study has implications for other

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agricultural and natural resources disciplines at the post-secondary level.

The purpose of this study was to examine feelings, interest, mood and flow in pre-service undergraduate AFNRE students. This research was guided by the following research objectives:

1. Develop a methodological approach to measure flow during pre-service undergraduate AFNRE student experiences;
2. Examine relationships between undergraduate activities and frequencies of four channels (flow, anxiety, apathy and boredom); and
3. Determine if relationships exist between flow, feeling, interest and mood are framed within the context of specific AFNRE student experiences.

Flow Theory

An important principle of learning is student motivation (Newcomb et al., 2003). Flow studies explore individual's intrinsic motivation to learn (Askawa, 2010; Decloe et al., 2009; Wöran and Arnberger, 2012) and engagement in learning (Shernoff et al., 2003) based on situational involvement as a key determinant of the construct. Based on flow theory, intrinsic motivation includes the composite scores of interest, enjoyment and the inverse of wishing you were doing something else (Csikszentmihalyi and Csikszentmihalyi, 1988), whereas engagement scores are calculated based on composite scores of concentration, interest and enjoyment (Shernoff et al., 2003). The "four-channel model of flow" is based on the following assumptions: (1) flow occurs when perceived challenge and skill are above an individual's personal average; (2) anxiety occurs when perceived challenge is greater than skill; (3) boredom occurs when perceived skills exceed challenge; and (4) apathy occurs when both perceived challenge and skill are below the personal average (Csikszentmihalyi, 1997; Csikszentmihalyi and Csikszentmihalyi, 1988) (Figure 1). Flow is commonly measured using the Experience Sampling Method (ESM), a method in which participants complete a survey instrument while involved in an activity. Respondents fill out questions related to interest level, mood and challenge while engaged in the activity. Researchers caution the use of paper-pencil surveys as participant issues may arise including attrition, motivation and reactivity of participants to recollect specific features of an activity may be potential challenges related to a successful ESM study (Scollon et al., 2003). Currently, application of flow theory to agriculture, food and natural resources education has received little attention.

Methods

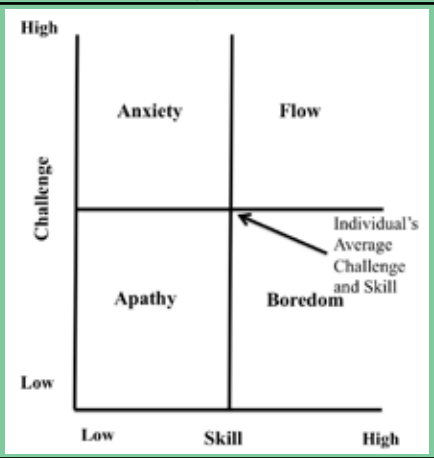
Data were collected at Michigan State University in the spring semester of 2012 in a program planning course required for all senior level pre-service AFNRE teachers. There were five pre-service AFNRE undergraduates that participated in the study. The research instrument for this study was a modified electronic version of the Experience Sampling Method (ESM) (Csikszentmihalyi and Larson, 1987; Hektner et al., 2007). Michigan State University Institutional Review Board deemed this study exempt.

This study used signal-contingent sampling (i.e., taking a survey at random times over the course of many days or weeks) and a modified ESM to capture individuals' representations of experiences as they occurred within the context of everyday life activities (Hektner et al., 2007). Participants met with the researcher prior to the study for an orientation on filling out the electronic version of the ESM. At the ESM orientation meeting, participants were e-mailed a sample Experience Sampling Form (ESF) and asked to fill out the survey to make sure that procedures were understood. Respondents utilized cellular phone technology, which signaled them six times daily for a weekly total of 30 signals to fill out the ESF. The ESF was designed to elicit information related to participants' daily location, activities and accompanying psychological states (e.g., feelings, interest, mood). Participants were e-mailed at random times between 8:00 AM to 8:00 PM daily from May 16 to May 20, 2012.

In order to obtain consistent and reliable ESM data, incomplete surveys were not included in the data set for analysis. For this study, five participants completed a total of 114 ESF's, which amounts to a response rate of 76% (6 signals a day for 5 days x 5 participants = 150 total potential responses). By comparison (Asakawa, 2004), the response rate of Japanese college students using the ESM was 73% over a similar study period. Thus, the response rate of the present study was deemed acceptable by the researchers.

Questions in the ESF measured quality of experience, which examined interest and challenge of the ESM activities using 5-point Likert scale questions from "Not at All" to "Very Much." Interest and challenge questions in the ESF measured concentration, enjoyment, activation, satisfaction, perceived control of the situ-

Figure 1.



The four-channel flow model applied to Experience Sampling Method (ESM). The origin for the optimal experience is the individual average of challenge and skills. Only when an individual is above that point does flow begin (Adapted from Csikszentmihalyi and Csikszentmihalyi, 1988; Massimini and Carli, 1988).

ation and perceived importance for the future. Mood of respondents was also measured with 5-point Likert scale items (e.g., weak-strong, sad-happy). Intrinsic motivation was calculated using the composite scores of interest, enjoyment and the inverse of wishing you were doing something else (Csikszentmihalyi and Csikszentmihalyi, 1988), whereas engagement scores were calculated based on composite scores of concentration, interest and enjoyment (Shernoff et al., 2003).

Data were analyzed using the SPSS 20.0 statistical software package. Descriptive data relating to the research objectives were analyzed to describe flow channels, feelings, interest and mood of respondents. This research used non-parametric analytical procedures due to the small number of respondents (n = 5). For the purposes of assessing four-channel flow model data, student flow survey responses were converted to Z-scores to control for individual response bias. Challenge-skill survey questions were used to determine channels (i.e., flow, anxiety, boredom and apathy) within the four-channel model (Csikszentmihalyi and Csikszentmihalyi, 1988; Massimini and Carli, 1988). Determining flow and non-flow in the original model required a literal match of challenge-skill data. Conversely, the four-channel model of flow was used to measure the balance of Z-scores for challenge-skills in each of the four channels (e.g., flow, anxiety, boredom and apathy).

The four-channels of anxiety, apathy, boredom and flow were coded into interval variables that measure the level of challenge and skill, as well as associated indicators of interest and mood. Using individual challenge and skill ratings for each of the activities measured (i.e., At Class, At Home, On Campus, Traveling, FFA Activity, Other): (1) boredom was observed when an individuals perceived skill exceeded challenge; (2) anxiety was observed when perceived challenge exceeded skill; (3) apathy was observed when both measures were below the individuals average; and (4) flow was observed when both challenge and skill were above the groups average over the entire experience. In this study, flow was measured by the quotient of challenge to skill levels perceived by respondents in the electronic ESF Survey (Figure 1). Average challenge and skill levels among respondents were calculated as the intersection of the four constructs in determining whether flow was occurring or not and at what level (Figure 1).

Results and Discussion

Of the activities measured during this study, the percentages of time spent during activities indicated by respondents included: 1) at home (33.3%); other activities not represented (32.5%); in class (17.5%); involved in a FFA activity (8.8%); traveling (4.4%); and on campus (3.5%) (Table 1).

There were 17 occurrences of boredom, 17 occurrences of flow, 19 occurrences of apathy and 61 occurrences of anxiety with the five respondents in the study during the week recorded (Table 1). When signaled 80% percent of respondents indicated that they were in the anxiety channel during various classroom settings. However, when signaled while participating in an FFA activity 50% of respondents indicated being in the state of flow.

Ratings of interest, feeling and mood constructs indicated that respondents perceived control, personal expectations, concentration on the activity, happiness and relaxation higher than other characteristics measured (Table 2). Participants in the study rated "Paradox of Control" (M = 3.6, SD = 1.1), "Own Expectations" (M = 3.6, SD = 0.9) and "Concentration on Task at Hand" (M = 3.5, SD = 1.0) higher than any other ESM interest and feeling constructs (Table 2). Therefore, respondents reported moderate levels of feeling as though they were in control, having high expectations for themselves and concentrating on the activity when measured.

Reported correlations in Table 3 are constructs of flow. Noted results include strong positive Pearson correlation ($r > 0.80$) relationships between Interest in the Activity and Intrinsic Motivation ($r = 0.81$, $p < 0.01$); Intrinsic Motivation and Enjoyment of the Activity ($r = 0.91$, $p < 0.01$); Interest in the Activity and Engagement

Table 1. Frequency of flow theory channels of undergraduate pre-service educator during a one-week Experience Sampling Method (ESM) experience from May 16 to May 20, 2012 (n = 114 responses).

Measurement Stage	Flow	Anxiety	Boredom	Apathy
In Class	1 (5.0%)	16 (80.0%)	3 (15.0%)	0 (0.0%)
At Home	2 (5.3%)	22 (57.9%)	4 (10.5%)	10 (26.3%)
On Campus	0 (0.0%)	1 (25.0%)	2 (50.0%)	1 (25.0%)
Traveling	1 (20.0%)	1 (20.0%)	0 (0.0%)	3 (60.0%)
Involved in an FFA Activity	5 (50.0%)	2 (20.0%)	1 (10.0%)	2 (20.0%)
Other (not specified)	8 (21.6%)	19 (51.4%)	7 (18.9%)	3 (8.1%)
Total Frequency	17	61	17	19

Note: Data is from *Crafting Teaching Practices* a 400-level course with five students taught in the 2012 fall semester at Michigan State University.

Table 2. Undergraduate pre-service Agriculture, Food, and Natural Resources (AFNR) educator descriptive statistics during a one-week ESM experience from May 16 to May 20, 2012 (n = 114 responses).

	Mean	S.D.
Interst and Feeling Constructs		
Self-Improvement	3.3	1.1
Intrinsic Motivation	3.2	1.0
Engagement	3..4	0.8
Merging of Action and Awareness	3.3	1.1
Concentration on Task at Hand	3.5	1.0
Peer and Family Expectations	3.1	1.0
Own Expectations	3.6	0.9
Paradox of Control	3.6	0.9
Mood Constructs		
Happy	3.4	1.0
Relaxed	3.4	0.9
Sociable	3.4	1.0
Excited	3.3	0.9

Note: Data is from *Crafting Teaching Practices* a 400-level course with five students taught in the 2012 fall semester at Michigan State University. Respondents were asked to rate (1 – Not at All to 5 – Very Much) their experiences of interest, feeling, and mood constructs as relationships to flow.

Table 3. Undergraduate pre-service Agriculture, Food, and Natural Resources (AFNR) educator Pearson correlations between flow, feeling, and interest constructs during a one-week Experience Sampling Method (ESM) experience from May 16 to May 20, 2012 (n = 114 responses).

Variables	1	2	3	4	5	6	7	8
Flow Channel	-							
Interest in the Activity	.07	-						
Control of the Situation	.26**	.65**	-					
Concentration on the Task	-.10	.31**	.24**	-				
Learning or Getting Better	-.27**	.47**	.34**	.50**	-			
Continuing the Activity in the Future	.15	.54**	.65**	.21*	.33**	-		
Intrinsic Motivation	.26**	.81**	.68**	.16	.17	.57**	-	
Engagement	.13	.90**	.73**	.57**	.48**	.60**	.83**	_
Enjoyment of the Activity	.31**	.74**	.76**	.10	.19*	.60**	.91**	.83**

*$p < .05$. **$p < .01$. Note: Data is from *Crafting Teaching Practices* a 400-level course with five students taught in the 2012 fall semester at Michigan State University.

(r = 0.90, p < 0.01); Intrinsic Motivation and Engagement (r = 0.83, p < 0.01); and Engagement and Enjoyment of the Activity (r = 0.83, p < 0.01) (Table 3). These results indicate that subjects, who participated in activities just for the sake of doing them, were also likely to have strong interest, enjoyment and be engaged in those same activities. Additionally, respondents who were highly engaged in an activity were also likely to be very interested and enjoy the activity.

Summary

It is important to not only understand that how students learn is also dependent on their feelings, interest and mood that they bring into a learning environment. Results indicated that there is predictive value to those subjects and their feelings, interests and mood over the course of a one-week measurement period. Findings of this study illustrate utility in our methodological approach for measuring and understanding pre-service undergraduate AFNRE students and constructs of flow during daily activities and specific events associated with their chosen professional career goals. Further, results indicated that respondents who were participating in an FFA-related activity were more likely to be in flow than any of the other channels. This research supports the results of Downey (2012) that experiential learning provides positive learning outcomes for students. Interestingly, there was a high incidence of perceived anxiety by undergraduate respondents during the week that data was collected. Fifty-four percent of responses indicated that subjects were in the anxiety channel when in class, at home, on campus, traveling, or involved in another activity. This result supports the notion that being an undergraduate student is an anxiety-filled time in one's life and that providing learner-centered activities during instruction may provide relief from those anxious moments.

Second, application of flow theory and methods to pre-service undergraduate teacher education provides noteworthy insights about student interest in AFNRE curricula, as flow theory is clearly applicable to undergraduate education (Asakawa, 2010; Asakawa, 2004, Rogatko, 2009). In post-secondary AFNRE instruction, FFA is considered to be one of three integral features of programmatic learning along with classroom and laboratory instruction and Supervised Agricultural Experience (SAE) (Phipps et al., 2008). The researchers suggest the possibility of applying measurement tools herein to the remaining two components of a program not measured in this study. This may include flow measurements during various forms of classroom and laboratory learning including: lecture, discussion and hands-on application. Additionally, measurement should occur during SAE visits where pre-service undergraduate students would act in an advisory capacity to secondary students and their individualized projects. Research suggests that promoting a wide range of experiential activities in post-secondary instruction would encourage student engagement in various learning activities such as FFA and SAE and become more involved in those experiences (Phipps et al., 2008). Use of social-psychological indicators has been cited as a potential opportunity to better understand educational experiences of undergraduates (Asakawa, 2010; Asakawa, 2004) and as a result, leading to enhanced student learning.

Methods proved in this study are applicable to the case of pre-service undergraduate AFNRE students in the context of a one-week measurement period and provide an opportunity for investigation through further research studies. Although measuring flow constructs in undergraduate experiences is limited, research suggests that concepts related to flow were likely to occur during learning activities (Asakawa, 2010; Asakawa, 2004; Bassi and Delle Fave, 2004; Rogatko, 2009). We recommend implementation of this methodological approach within other agriculture and natural resources courses in an effort to better understand experiential learning and constructs of flow that may provide insight into learning by undergraduate students in the CANR.

In practice, this study suggests that post-secondary AFNRE faculty should consider employment of experiential activities as part of classroom instruction as a way to stimulate learning among pre-service undergraduate AFNRE students. Providing AFNRE undergraduates with learner-centered experiences where students are working with secondary AFNRE students in the form of FFA activities provided flow channel experiences, whereas traditional classroom experiences were non-flow channel experiences (e.g., apathy, anxiety, or boredom). Therefore, it may be beneficial for faculty to include significant experiential activities as a function of classroom learning (e.g., SAE visits, leadership activities, judging experiences, field experiences).

Procedures and methods in this study may be adapted to other disciplines, however caution should be used. This was an exploratory study with sample size (n = 5) as a major limitation to this study that precluded particular statistical procedures to compare

relationships between background and demographics and ESM data (Hektner et al., 2007). However, despite this limitation, the results of this study confirm other flow theory validation studies conducted with undergraduate populations and merit further implementation and study.

Methodological approaches of this study proved a successful way to measure respondent feelings, interest, mood, challenge, skill and flow during one week at a Land-Grant University. This research provides a framework for application in other agriculture and natural resource undergraduate programs.

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Impact of a Study Abroad Course on Students from 1862 and 1994 Land-Grant Institutions[1]

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Abstract

Universities must prepare their students to work in an increasingly diverse and global workplace. However, minority students, particularly Native Americans, continue to be under-represented in agriculture and study abroad. Partnerships between tribal colleges and universities (TCUs) and predominately white institutions (PWIs) could provide substantial benefits to students at both types of institutions. Students from Purdue University and Haskell Indian Nations University (HINU) participated in a 15-day travel course to Costa Rica from 2010 to 2012. An online questionnaire was administered in 2013 to assess student perceptions at least one year after completing the course. Respondents at both universities indicated that the course increased their knowledge of agricultural production systems and tropical ecosystems as well as their understanding of cultural and ethnic diversity in Costa Rica. Respondents also indicated that their experience reinforced their commitment to studying a foreign language, enhanced their interest in academic study and encouraged them to explore other cultures. Open-ended responses suggest that students viewed interacting with indigenous groups in Costa Rica as the most memorable and engaging component of the course. This study suggests that study abroad programs can be developed and offered through partnerships between TCUs and PWIs that provide substantial benefits to participants.

Introduction

The percentage of people of color in the U.S. is expected to reach over 50% by 2050 (United States Census Bureau, 2012) and the need for colleges and universities to provide students with an international perspective has been noted by several organizations (Commission on the Abraham Lincoln Study Abroad Fellowship Program, 2005; American Council on Education, 2008; National Research Council 2009; APLU 2009). Thus, universities should prepare their students to work in an increasingly diverse and global workplace (Matveev and Miller, 2004; Zhai, 2004). Study abroad programs have been promoted as a mechanism to increase international understanding and to prepare students to compete in a global marketplace. Study abroad can have profound effects on participants including greater openness to cultural diversity, increased intercultural proficiency and communication skills, greater self-confidence, higher starting salaries after graduation and can affect subsequent educational and career choices (Paige et al., 2009; Clark et al., 2010; Preston, 2012). Sutton and Rubin (2004) found that undergraduates who participated in study abroad programs had higher graduation rates, grade point averages and better cultural competencies than undergraduates who did not study abroad. The findings were particularly pronounced for at-risk and minority students.

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Although the percentage of minority students participating in study abroad increased from 2002 to 2012, U.S. students attending study abroad programs in 2011-12 were disproportionately white (76.4%) and female (64.8%) (IIE, 2013a). Perdreau (2002) identified several barriers for ethnic minority students including a lack of funding, concern about their acceptance in other countries, the perception that study abroad programs do not provide culturally relevant experiences and the belief that study abroad is an unnecessary distraction from obtaining a degree. Similarly, Brux (2010) noted that barriers to the participation of minority students in study abroad can include "finances; family concerns and attitudes; fear of racism and discrimination; historical patterns, expectations and attitudes; institutional factors; and a lack of relevant study abroad programs" (p.515). Calhoon et al. (2003) suggested that Native Americans studying at Tribal Colleges and Universities (TCUs) might find it particularly difficult to access study abroad programs. Indeed, Native American students comprised only 0.5% of study abroad students in the U.S. in 2012, a statistic largely unchanged from 2002 (IIE, 2013a). Calhoon et al. (2003) argued that TCU faculty often carry substantial teaching loads that preclude organizing logistically challenging study abroad programs and that TCUs may lack the financial resources to support study abroad programs.

The National Resource Council (2009) noted that "academic programs in agriculture tend to exist in isolation" (p. 3) and recommended greater interactions among institutions. More specifically, they noted that pathways from TCUs to careers in agriculture have not been highly successful and recommended that institutional partnerships be developed with tribal colleges. Tribal colleges enroll approximately 19% of all Native American students (Harmon 2012) and, as land grant institutions with close ties to local tribal communities, have tremendous potential to engage students in agriculture. Thus partnering with a PWI with the necessary resources to fully support study abroad programs might be particularly beneficial for TCUs. Calhoon et al. (2003) recommended that study abroad programs which include "communities in which American Indian students share some common characteristics may help students from both communities self-assess their experiences as more meaningful to their educational goals" (p.48). The authors also emphasized the importance of culturally relevant programs to attract Native students. Tarant et al. (2013) examined the interaction of location (abroad or at home campus) and academic focus (sustainability or non-sustainability topics) on global citizenship scores for 286 students. They concluded that the combination of study abroad and a focus on studying sustainability through experiential learning resulted in the greatest increase in global citizenship scores.

Methods and Materials

The primary goal of this study was to assess the self-perceived value of a travel course in Costa Rica for students at least one year after the completion of the course. Students from Haskell Indian Nations University (HINU) in Lawrence, KS and Purdue University (Purdue) in West Lafayette, IN participated in the course. We were interested in knowing if student perceptions of the course would vary by institution and in suggestions students might have for improving future courses.

Institutions

Although HINU and Purdue are both land grant institutions, they differ substantially in student enrollment and demographics, course offerings, number of majors and support for study abroad. HINU has an average yearly enrollment of approximately 1000 undergraduate students who are members of federally recognized tribes across the United States. Purdue is a PWI with an annual enrollment of approximately 30,000 undergraduate students, primarily from within the state of Indiana. Students at Purdue have access to many majors with the College of Agriculture and to dozens of majors in STEM disciplines. However, HINU does not offer courses in agriculture and the only STEM undergraduate degree at HINU is in Environmental Science. HINU lacks a formal study abroad program; Purdue offers dozens of study abroad courses each year. HINU and Purdue partnered with CATIE (Centro Agronomico Tropical de Investiacion y Ensenanza). CATIE is located in Turrialba, Costa Rica but serves member countries throughout Latin America and offers graduate degrees (undergraduate degrees are not offered) to students interested in the sustainable use of natural resources and agriculture. CATIE students did not participate in the travel course, but CATIE facilities and faculty were integral to this endeavor.

Course Preparation

A mandatory three-credit preparatory course entitled "Multicultural Perspectives on Sustainable Agriculture" was team-taught by four instructors (two from Purdue, one from HINU and one from CATIE) and offered during spring semester in 2010, 2011 and 2012 (Gibson et al., 2014). Classes were held twice each week (each lecture was 75 minutes) using Adobe® Connect, a web-based communication platform. We addressed five main topics each semester: (1) perspectives on the sustainability of U.S. agriculture, (2) an indigenous perspective on land use and agriculture, (3) biodiversity and tropical ecosystems, (4) Costa Rica history and culture and (5) tropical crops. Preparations for safe international travel, including logistics related to travel to and in Costa Rica, were also addressed. Students and faculty met in-person during visits to the partner institution (Gibson et al. 2014). Forty-six students (25 from HINU, 21 from Purdue) took the preparatory course and 33 students (14 from HINU, 19 from Purdue) went on the travel course from 2010 to 2012.

Differences in travel course participation between the universities can be attributed to two primary factors. First, Purdue students enrolled in the preparatory course primarily because it was a prerequisite for the

travel course. Several HINU students, however, enrolled in the preparatory course because it allowed them to study a topic not offered at HINU. Second, although Purdue students typically used their own funds to pay for the travel course (some funds were available through the university to offset expenses), no HINU students participated in the travel course that were not fully supported by external funds. Thus it is likely that funding limited HINU student participation. Course expenses, which included airfare, lodging, food, transportation in Costa Rica and fees associated with in-country tours, varied among years but were generally < $2800.

Travel Course

The 15-day travel course incorporated elements of a previous Purdue travel course (Gibson et al., 2012) that focused on biodiversity in Costa Rica and that included tours of key agricultural systems (coffee, cacao, banana, rice, fish and cattle) led by farmers or ranchers and of natural systems (lowland rainforest, humid montane forest and dry forest). However, visits to three indigenous villages were added to the new course and a greater emphasis was placed on cultural perspectives of sustainability than in previous years. Students were encouraged to record their daily experiences in a journal and were required to write short essays reflecting on their experiences. The essays were read and critiqued by course instructors. Evening conversations, facilitated by instructors or by pairs of students, were held every three or four days to allow students to discuss and reflect on their experiences and on assigned topics as a group. This process followed Kolb's "learning cycle" model in which students experience an environment, reflect on their experience and then analyze the experience (Montrose, 2002). Aside from a brief orientation meeting during the first day of each course, students were not in classrooms during the course. Most activities were structured and led by instructors; however, the course typically included two "free days" when students could plan their own activities and 2 to 3 half-days when students were unsupervised but engaged in semi-structured activity such as making specific purchases in marketplaces.

Self-evaluation of learning can be an important measure of teaching effectiveness (Bruening et al., 2002). An invitation to complete a 24-question online survey was sent by email to former students in fall 2013, approximately 1 to 3 years after participation in the travel course. Eight questions were used to collect information on student demographics and to determine if students had traveled abroad after participating in the travel course. We used 10 Likert-type questions to determine if the course affected key learning outcomes and personal growth and 6 open-ended questions to elicit further comments on their experience (Table 1). Thirty-three students (19 from Purdue, 14 from HINU) went on the study abroad course from 2010 to 2012. Seventeen of the 19 Purdue students (89.4%) and 8 of the 14 HINU students (57.1%) provided usable surveys. A majority of responses were received within three days of posting the survey; additional emails were sent every four days and the survey was closed after no new surveys had been received for 5 days. Fisher's exact test was used to identify significant differences between institutions for participant ratings of categorical variables, i.e., statements used to assess learning outcomes and personal growth.

Results and Discussion

HINU respondents were older than the Purdue students (the mean age of HINU and Purdue respondents in 2013 was 26.6 +/- 1.1 SE and 23.2 +/- 0.5 SE, respectively) and a majority of HINU respondents (63%) were female (Table 2). TCUs typically have older student populations than PWIs (Institute for Higher Education Policy, 2006) and a majority of undergraduates studying abroad are female (IIE, 2013b). However, men and women were equally represented among Purdue respondents (Table 2). Most students were in their junior or senior year when they took the preparatory course (Gibson et al., 2014) and a majority of respondents (71% of Purdue respondents and 63% of HINU respondents) had graduated at the time of the survey (Table 2). This corresponds to national enrollment patterns; juniors and seniors comprise 60% of study abroad students in the U.S. (IIE, 2013b). Four Purdue students and two HINU students were enrolled in graduate school when they completed the questionnaire. A majority of HINU

Table 1. Open-ended questions used to assess the self-perceived value and impacts of a two-week travel course in Costa Rica course and suggestions for course improvement. Haskell Indian Nations University and Purdue University students participated in the course from 2010 to 2102. Survey data were collected in fall 2013.

1.	When you think about the course, what comes to mind first?
2.	What experience made you feel the most immersed in the country?
3.	Students on the trip varied in their ethnic, cultural, and socioeconomic backgrounds. How do you think that affected group dynamics and your personal experience?
4.	Did the course affect how you viewed your studies or career upon your return? Please explain.
5.	If you had the opportunity to go on a similar course or trip, would you do anything different to prepare? Would you do anything differently during the course?
6.	What would have improved the experience for you?

Table 2. Current educational status, number who traveled abroad either before or after the travel course, and age[1] of students from Haskell Indian Nations University (HINU) and Purdue University (PU) who completed an online questionnaire in fall 2013. Respondents participated in a two-week travel course in Costa Rica offered from 2010-2012.

	Respondents			Current educational status			Travel status[3]	
	Male	Female	Total	Undergraduate	Alumni[2]	Other	Traveled abroad before the course	Traveled abroad after the course
HINU	3	5	8	1	5	2	3	2
PU	9	8	17	4	12	1	5	9

[1]Mean age for HINU and PU students was 26.6 +/- 1.1 SE and 23.2 +/- 0.5 SE, respectively, in 2013.

[2]Four Purdue and two Haskell students were enrolled in graduate school in 2013.

[3]50% of Purdue students and 40% of HINU students who had never traveled abroad before the course reported traveling abroad after the course.

(62%) and Purdue (71%) respondents had not traveled abroad before the course. More than half of the Purdue respondents but only a quarter of the HINU respondents traveled abroad after the course (Table 2). Of the respondents who did not travel abroad after the course, one indicated that he or she was traveling within the United States by choice and the remaining respondents indicated that a lack of funding or conflicts with work or school limited their ability to travel abroad.

Learning Outcomes and Personal Growth

Ratings (> 4 for all learning outcome statements on a scale from 1 to 5) suggest that respondents at both universities believed that the course increased their knowledge of agricultural production systems and tropical ecosystems as well as their understanding of cultural and ethnic diversity in Costa Rica and of how culture affects land use practices (Table 3). Study abroad can be a catalyst for personal growth. Dwyer (2004) surveyed 3700 alumni of study abroad programs offered by the Institute for the International Education of Students (IES) between 1950 and 1999. IES respondents (>80%) indicated that their experience reinforced their commitment to studying a foreign language and enhanced their interest in academic study. The respondents also indicated that their experience increased their interest in travel, boosted their self-confidence and encouraged them to explore other cultures. Similarly, ratings (>3.9 for all personal growth statements) in our study suggest that respondents at both HINU and Purdue agreed that the course increased their interest in and comfort level with people from other cultures as well as their interest in improving their foreign language skills and confidence to travel abroad (Table 3). They also agreed that the course increased their interest in purchasing food that was produced sustainably (Table 3). Differences in ratings between the universities were not detected for any learning outcomes or personal growth statements.

Open-ended Questions

Most responses to the question "When you think about the course, what comes to mind first?" could be placed into one of three categories: people and culture, farming systems and the natural beauty of the environment (Figure 1). Other responses were food and recreation (snorkeling and white water rafting). A majority of respondents (71%) identified the visits to indigenous communities as the activity that made them feel the most immersed in the country (Figure 2). The visits included short presentations by community leaders during which they discussed the history of the community and current efforts to build sustainable businesses. A common theme discussed by each indigenous community, which particularly resonated with HINU students, was their efforts to retain or rebuild their language and culture under difficult circumstances. The visits also included service learning opportunities, such as assisting with banana vinegar production or with planting crops and recreational opportunities, including an impromptu game of baseball with children using improvised equipment and bases, to interact with a range of community members. We believe that the visits to indigenous villages were particularly powerful because they were culturally relevant for HINU students and because they provided all students with a more encompassing view of community life than was possible with the more focused visits to farms and forests. However, it is possible that this simply reflects the relative amount of time spent in the communities. We spent a full day at each indigenous community (we spent the night at one community in 2010 and 2011) while tours of farms and forests typically lasted no more than a half-day.

Increasing the participation of students from underrepresented groups in study abroad has potential benefits for both majority and minority culture students (Brux, 2010). We asked if participants in the course thought that the diverse ethnic, cultural and socioeconomic backgrounds of their fellow students affected their personal experience. None of the respondents indicated that the diversity of student backgrounds negatively impacted their personal experience and several indicated that their experience was enhanced because of the diversity. One respondent wrote "*I think it enriched the experience and made it more worthwhile. Due to the fact that we were all from different backgrounds, we tended to have different viewpoints on different subjects, which made group discussions a learning experience.*" Another student wrote "*To my surprise, even though students varied in ethnic, cultural and socioeconomic backgrounds, we all could relate fairly close to one another through personal experiences, thoughts, ideas, etc.*" However, some respondents noticed that students tended to interact more with students from their own institution and that there was

Table 3. Mean ratings[1] related to self-perceived learning outcomes and personal growth for students from Haskell Indian Nations University (HINU) and Purdue University (PU) who completed an online questionnaire in fall 2013. Respondents participated in a two-week travel course in Costa Rica offered yearly from 2010-2012. No differences in ratings were detected between universities, according to Fisher's exact test. Parentheses enclose standard errors.

	HINU	PU
Learning Outcomes		
The course increased my knowledge of Costa Rica's agricultural production systems	4.9 (0.1)	4.6 (0.1)
The course increased my knowledge of tropical ecosystems	4.8 (0.2)	4.5 (0.2)
The course increased my knowledge about how food is produced	4.5 (0.2)	4.2 (0.2)
The course increased my understanding of how culture affects land use practices	4.4 (0.3)	4.4 (0.2)
The course increased my understanding of cultural and ethnic diversity in Costa Rica	4.9 (0.1)	4.6 (.01)
Personal Growth		
The course helped me to become more comfortable interacting with people from other cultures	4.3 (0.3)	3.9 (0.2)
The course increased my interest in interacting with people from other cultures	4.3 (0.1)	4.0 (0.1)
The course increased my motivation to learn another language or to improve my Spanish	4.3 (0.2)	4.0 (0.2)
The course increased my confidence to travel abroad	4.4 (0.2)	4.1 (.03)
The course increased my interest in purchasing food that was produced sustainably	4.5 (0.2)	4.1 (0.2)

[1]Ratings are based on a 5-point scale where 1 point = strongly disagree and 5 points =strongly agree.

Figure 1. Percentage of responses when asked what came to mind first when respondents thought about the course.

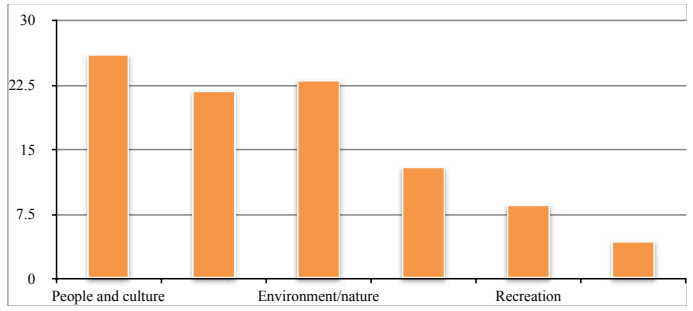
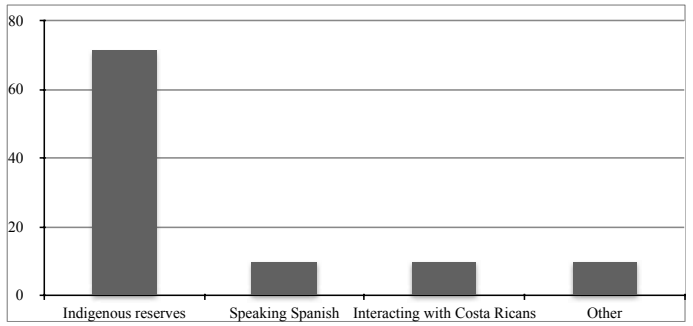


Figure 2. Percent of responses indicating the experience that made the respondents feel the most immersed in the country.



some tension among the groups at times. One respondent wrote that "the Haskell and Purdue students tended to stay in separate groups" and another noted that there were "some culturally insensitive actions" but also that there was "growth and exchange between our two groups as we both grew in our experiences." One respondent questioned the importance of student backgrounds, noting that "*personalities were more of an issue than background. Too many strong personalities in one tiny bus made for a little tension.*" Since one of the goals of the course was to increase interaction among Purdue and Haskell students, we were encouraged by a student who wrote "*I thought the diverse group ended up bonding very well with each other. A number of us even met after the trip almost a year later to catch up. Most of us are connected through social networks which has allowed us to keep in touch with one another.*"

Respondents were asked if the course affected how they viewed their studies or career upon their return. Only one respondent indicated that the course had no effect. The remaining respondents indicated that they felt more motivated to do well in their studies and to pursue opportunities in their chosen career. One respondent wrote "*having that experience helped make what I was learning in the classroom feel more relevant. When learning about sustainability in the class room I could think about the sustaining farming methods we viewed first hand in Costa Rica.*" Another respondent wrote, "*I realized that most systems have problems and instead of always trying to find something better, my time would be better spent trying to improve a system that I know, in Indiana.*" Several Haskell students wrote that it increased their interest in working with tribes. "*I felt more focused on merging indigenous studies with the environmental sciences. I transferred to a school where I could do an interdisciplinary of the two."* Another student commented, *"Upon finishing the course, I felt a lot of fire through me to … help with my own culture. In my home state there is one problem that stands out above the rest and that is water quality and in general water itself. Since the course, I have landed a job working with water quality."* Three respondents indicated a new or renewed interest in working internationally.

We believe that the positive views of the course expressed by the respondents reflect three key strategies employed by the instructors. First, we focused our examination of sustainability on the perceptions of stakeholders (farmers, land managers, community members), including students and their friends and families. This included presentations by the students during the preparatory course in which they interviewed friends and family about agriculture and sustainability and provided their own perspectives and information on their backgrounds (Gibson et al., 2014). During the travel course, the instructors facilitated discussions that allowed students to express their perspectives on how culture affects views of sustainability. Second, we integrated indigenous perspectives in both the preparatory and travel course to address concerns that study abroad courses can be culturally irrelevant to Native American students (Calhoon et al., 2003). Finally, the three-credit preparatory course covered material in sufficient depth that students spent no time in classrooms during the travel course; this maximized the time students spent interacting with a diversity of Costa Ricans and the physical environment. The preparatory course also allowed students to interact and develop friendships before the travel course.

Suggested Course Improvements

Eight students (four from HINU, four from Purdue) indicated that they would not do anything differently to prepare for or during the course. Three Purdue students and four HINU students indicated that they would work harder on their Spanish and two Purdue students wrote that they would gather additional information on the country. Comments to improve the course focused on providing more free time and spreading events more evenly across the two weeks. The course typically included two days in which activities were not scheduled and two to three half-days when students were unsupervised but engaged in semi-structured activities such as a making a specific purchase in grocery stores. Three Purdue entomology students wanted a greater emphasis on insects and additional opportunities to collect specimens. Several students suggested that the instructors provide opportunities during the pre-trip preparatory course for students to work on their Spanish.

Summary

Respondents were interviewed one to three years after completing the travel course. Both HINU and Purdue students indicated that the course increased

their knowledge of key topics and contributed to personal growth. Positive responses to both open and close-ended questions suggest a lasting impact of the course on participants. Despite differences in age and ethnicity, the HINU and PU students did not differ in their positive assessment of the course and written comments suggest that respondents believed that the multicultural composition of students and faculty enhanced their experience. This study suggests that study abroad programs can be developed and offered through partnerships between TCUs and PWIs that provide substantial benefits to students at both institutions.

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Teacher Immediacy and Professor/Student Rapport as Predictors of Motivation and Engagement[1]

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Abstract

Recommendations for reforming teaching and learning in colleges of agriculture have suggested that instructors implement more student-centered instructional strategies. This would require more self-regulation on the part of the learner; however, critics have proposed that undergraduate students have become increasingly unmotivated and disengaged with the teaching and learning process. Therefore, an investigation into improving the motivation and engagement of undergraduates is warranted. One possible way of increasing student motivation and engagement is through teacher immediacy and professor/student rapport. Thus, the purpose of this study was to examine the relationships of teacher immediacy and professor/student rapport, collectively, with student motivation and engagement. The sample (n = 306) for this study consisted of students from large (50 to 100 students) college of agriculture courses at the University of Florida in the fall of 2011. Data were analyzed using descriptive statistics and canonical correlation analyses. Participants perceived that their instructors used verbal and nonverbal immediacy behaviors often and they generally agreed they have good rapport with their instructors. Additionally, students reported having high levels of expectancy for success and values/goals, while they reported intermediate levels of self-regulated learning strategy use. The combined variables of teacher immediacy and professor/student rapport were better predictors of motivation than engagement and professor/student rapport appears to be the greatest contributor to these relationships.

Introduction

The Morrill Act of 1862 and the subsequent Hatch and Smith-Lever Acts provided the catalyst for an explosion of technological innovations in agriculture that allowed the agricultural industry to expand throughout the twentieth century. Nonetheless, the National Research Council (NRC, 2009) suggested that the dawn of the twenty-first century has brought more unexpected changes and presented greater challenges for agriculturalists unseen by previous generations. Among these challenges are growing world populations and the need to feed these populations, increasing global integration and competitiveness, the need for greater scientific knowledge, public health concerns, climate change and increased concerns of consumers (Association of Public and Land-grant Universities, APLU, 2009; NRC 1992; NRC, 2009). As a result, the NRC (2009) issued a challenge to colleges of agriculture, "*to establish a place at the forefront of academe where students and scholars are prepared to learn about the complexities of agriculture and grapple with its evolution and change and in so doing, find their opportunity to contribute as leaders and participants in the agricultural enterprise*" (p.3).

The vision of the NRC (2009) through this challenge and subsequent recommendations was to produce agricultural graduates capable of tackling tough societal issues.

The NRC (2009) posited that, if agricultural graduates are to be effective addressing these issues they must possess certain skills such as critical thinking, problem solving, teamwork and communication. However, many critics have suggested that graduates

[1]The University of Florida Institutional Review Board approved the study protocol and all participants provided written informed consent prior to participation in the study.

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leave postsecondary education lacking these skills. In an assessment of land-grant institutions, Campbell (1998) opined, "*Too often we have failed to assure an appropriately educated citizenry—graduates with sufficient skills to be effective workers and informed citizens*" (p.33). Additionally, the National Conference of State Legislatures (NCSL, 2006) remarked, "the American higher education system is not preparing students for the 21st century global society" (p.1). What is more, Kenny (1998) added, "*Many students graduate having accumulated whatever number of courses is required, but still lacking a coherent body of knowledge. . . .all too often they graduate without knowing how to think logically, write clearly or speak coherently*" (p.6).

Accordingly, many have recommended that teaching and learning in higher education needs to be overhauled, endorsing a paradigm shift from passive, teacher-centered instruction to active, student-centered instruction (e.g. Arum and Roksa, 2011; Bok, 1996; Edgerton, 2001; Smith, Sheppard, Johnson and Johnson, 2005). More specific to agricultural education, Estepp and Roberts (2011) suggested that instructors in colleges of agriculture should utilize a variety research-based teaching methods to improve students' acquisition of the aforementioned skills. However, Amundsen, Winer and Gandell (2004) opined that shifting the focus to active student learning will require new expectations of students as learning-centered instruction involving active and interactive methods of instruction requires a great deal of effort on the part of learners and many critics of higher education have attributed the decline in the quality of graduates to undergraduate students' lack of motivation and academic engagement (Arum and Roksa, 2011; Hassel and Lourey, 2005; Trout, 1997). Thus, an investigation into improving student motivation and engagement is warranted.

Literature Review

The theoretical framework that guided this study was social cognitive theory (Bandura, 1986). Bandura suggested that human learning occurs as a result of internal processes in conjunction with external influences. His theory is summarized by three main assumptions: the first assumption is triadic reciprocality; second, learning is enactive and vicarious; and third, learning and performance are distinctly different processes. This study is part of a larger study and focuses on the assumption of triadic reciprocality (See Figure 1). Bandura's assumption of triadic reciprocality proposes that learning is a product of bidirectional interactions between environmental variables, personal (cognitive) factors and behaviors. Bandura stated that the idea of reciprocal interaction does not imply equal interaction, but interaction between the three variables may be of varying strength and may not happen concurrently.

The conceptual model used in this study was adapted from work by Pintrich and Zusho (2007) (See Figure 2). Pintrich and Zusho (2007) posited that factors in the classroom context affect students' motivational processes and their use of self-regulatory processes. For the purpose of this study, classroom context factors were operationalized as teacher characteristics, which consisted of teacher immediacy behavior use and professor/student rapport. Pintrich and Zusho's motivational processes were operationalized in this study as motivation and consisted of the constructs of student expectancy for success, values/goals and affect. Student expectancy for success is characterized by students' beliefs in their ability to perform tasks and the control they have over their performance (Ormrod, 2008), while values/goals refers to the specific value that students place on tasks and how these tasks relate to their future

Figure 1. Triadic Reciprocality Model (Bandura, 1986, p. 24)

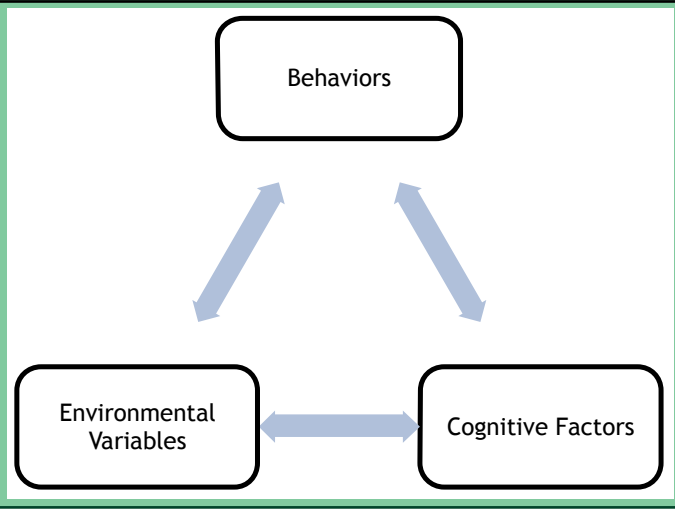
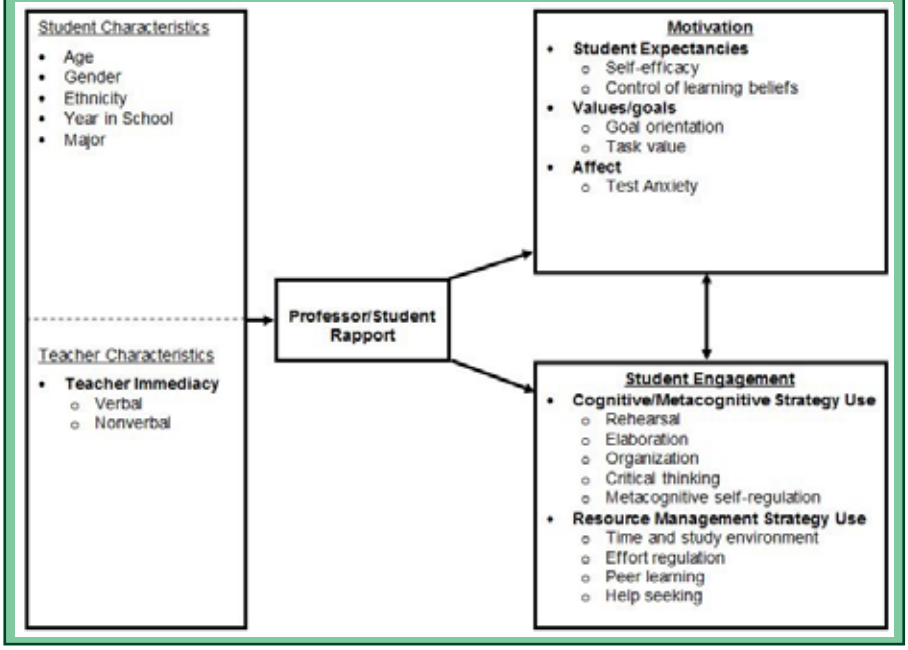


Figure 2. Conceptual Model of Motivation and Engagement (Adapted from Pintrich and Zusho, 2007).



goals (Eccles and Wigfield, 2002). In the context of this study, affect referred to test anxiety and is posited to be inversely related to motivation (Pintrich, 2004). Additionally, Pintrich and Zusho's (2007) self-regulatory processes were operationalized in this study as student engagement and consisted of the constructs of cognitive/metacognitive strategy use and resource management strategy use. Pintrich and Zusho (2007) proposed that engaged students are able to regulate their thinking processes along with their time and academic resources. The constructs in this study are congruent with triadic reciprocality in that teacher characteristics represent environmental variables, while motivation characterizes a cognitive factor and student engagement denotes behavior.

Ormrod (2008) defined motivation as "*an internal state that arouses us to action, pushes us in particular directions and keeps us engaged in certain activities*" (p.452), while Pintrich and Zusho (2007) further hypothesized that motivation is a gateway to students' academic engagement. A study by Pintrich and Schrauben (1992) reported that students with high levels of expectancy for success were more likely to exhibit increased levels of effort, monitor and regulate their learning, persist through difficult tasks and manage their study time and environment. Likewise, Walker, Greene and Mansell (2006) found that students' expectancy for success and intrinsic motivation were positive predictors of meaningful cognitive engagement. Furthermore, Fredricks, Blumenfeld and Paris (2004) and McLaughlin et al. (2005) purported that academic engagement is the key to student learning and that no learning can occur without engagement on the part of the student.

According to Pintrich (2004), motivation encompasses students' expectancy for success, values, goals, affect and emotions. Because motivation includes affective components, student motivation and subsequent engagement should be more likely in a learning environment where students feel more comfortable (Pintrich and Linnenbrink, 2004). What is more, Rodriguez, Plax and Kearney (1996) indicated that increases in the affective component of learning could help students expand their motivation, thus increasing their will to learn.

One indicator of a positive learning environment relating to affect is professor/student rapport built through teacher-student interactions (Wilson et al., 2010). Velez (2008) and Campbell (1998) suggested that student learning not only requires commitment on the part of the student, but that strong teacher-student interactions play a role. Chickering and Gamson (1987) submitted that a principal factor contributing to student motivation and engagement is teacher-student interactions. Rodriguez et al. (1996) offered that, if these interactions are positive, then students should feel more at ease in the classroom and enjoy the learning environment. Murray (1997) synthesized the literature on effective teaching and found that teacher-student interaction has shown "the strongest and most consistent relationships with instructional outcome measures" (p.195), while Cox, McIntosh, Terenzini, Reason and Lutovsky Quaye (2010) reported that teacher-student interactions have had positive effects on students' attitudes, cognition, classroom behaviors and relationships.

According to Wilson et al. (2010), one way instructors can build professor/student rapport is through the use of teacher immediacy behaviors. Teacher immediacy is characterized by the nonverbal and verbal behaviors used by instructors that create a psychological closeness between instructors and students (Christophel, 1990). Examples of nonverbal immediacy behaviors include, eye contact, smiling, nodding, gesturing and vocal variety, while verbal immediacy behaviors include, praising students' effort, use of humor, engaging in conversations with students, calling students by name and use of personal stories and examples in teaching. Previous research has shown that the use of immediacy behaviors by instructors has been positively related to student motivation (Chesebro and McCroskey, 2001; Christophel, 1990), student affect toward learning (Chesebro and McCroskey, 2001), student behaviors (Christensen and Menzel, 1998), cognitive learning outcomes (Chesebro and McCroskey, 2001) and student achievement (Wilson and Locker Jr., 2008).

Several studies relating to teacher immediacy in the agricultural sciences have also been conducted. Velez and associates (Velez, 2008; Velez and Cano, 2008) reported that the use of immediacy behaviors is positively associated with varying aspects of student motivation. Additionally, Estepp and colleagues (Estepp and Roberts, 2013; Estepp et al., 2013; Roberts et al., 2013) found that effective agricultural instructors tend to use a variety of immediacy behaviors and that immediacy is a significant predictor of students' beginning and ending motivation in agricultural courses.

Purpose

Because teacher immediacy and rapport have been shown to each aid in increasing student motivation, the purpose of this study was to examine the relationships of teacher immediacy and professor/student rapport, collectively, with student motivation and engagement. The specific research objectives that guided this study were:

- Assess undergraduate students' self-reported perceptions of teacher immediacy behaviors and professor/student rapport
- Assess undergraduate students' self-reported measures of expectancy, values/goals, affect, cognitive/metacognitive strategy use and resource management strategy use
- Determine the collective, predictive value of teacher immediacy and professor/student rapport on students' self-reported values of motivation and engagement.

Methods

The population for this descriptive correlational study was undergraduate students enrolled in large College of Agricultural and Life Sciences (CALS) courses with

between 50 and 100 students at the University of Florida during the fall 2011 semester. Heppner (2007) suggested that instructors in large college courses have trouble interacting one-on-one with students, therefore the assumption was made that building professor/student rapport might be more difficult in these classrooms. While no standardized definitions of course size exist, Friedel (2006) reported that prior research has deemed classes with more than 50 students to be large.

The sample (n = 306) consisted of students from ten separate courses taught by eight instructors. After approval by the University of Florida Institutional Review Board, invitations to participate in the study were sent via email to 28 instructors in CALS whose courses fit the criteria of the study. One instructor declined, one course was dropped from the study because it was taught exclusively online and 18 instructors did not respond. Eight of the instructors, however, agreed to allow their classes to participate in the study. Because the instructors were self-selected, this study was considered a convenience sample. In an attempt to determine the variability of the independent variable teacher immediacy, the participating instructors' past student evaluation scores were examined and the instructors were categorized into high, intermediate and low categories of immediacy. Moore et al. (1996) reported that a positive relationship exists between instructors' student evaluation scores and their teacher immediacy. One instructor was in the low immediacy group, two in the intermediate and five in the high immediacy group.

McMillan and Schumacher (2010) stated that convenience samples may not be generalized beyond the sample unless the individuals in the sample possess similar characteristics to the population. Therefore, a comparison was made between the sample and the population on several variables. An independent samples t-test was run to compare the sample to the population on the variable of age. The mean age of the population was 21.79 (SD = 2.57) and the mean age of the sample was 21.17 (SD = 2.87). Results of the t-test showed these means to be significantly different ($p < 0.001$); however, McMillan and Schumacher (2010) suggested that statistical tests with large numbers of respondents have an increased likelihood of statistical significance. The numbers of respondents in this test were n = 306 for the sample and N = 2033 for the population. As a result, effect sizes were calculated according to recommendations by Kotrlik et al. (2011). The Cohen's d value was 0.23, which according to Kotrlik et al. reveals a small effect size. Chi-square tests were utilized to compare the proportions of the sample and the population on gender and CALS versus non-CALS students. Results showed no significant difference between the two on the variable of gender ($x^2 = 3.58$, $p = 0.062$) and no significant difference existed on the variable of CALS versus non-CALS ($x^2 = 2.06$, $p = 0.163$). Thus, the sample was deemed to be representative of the population.

Three instruments were used to collect the data for this study. Teacher immediacy was collected using the immediacy behavior scale (Christophel, 1990). The immediacy behavior scale measured students' perceptions of the frequency of nonverbal and verbal immediacy behaviors used by their instructors. The scale consisted of 20 Likert-type verbal immediacy items and 14 Likert-type nonverbal immediacy items; both were measured from 1 (Never) to 5 (Very Often). Professor/student rapport was measured using the professor/student rapport scale developed by Wilson et al. (2010). The rapport scale consisted of 34 Likert-type questions ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Lastly, motivation and engagement were both measured using the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991). The MSLQ instrument contained 81 Likert-type items ranging from 1 (Not at all true of me) to 7 (Very true of me). Motivation was measured using the values/goals, student expectancy and affect constructs, while engagement was measured by the cognitive/metacognitive strategies use and resource management strategies use constructs. Post-hoc reliabilities were calculated for each of the instruments. For the immediacy behavior scale, the reliability coefficients (α) were 0.83 for verbal immediacy and 0.73 for nonverbal immediacy, while the reliability for the professor/student rapport scale was $\alpha = 0.96$. Additionally, reliabilities for the MSLQ were: student expectancies ($\alpha = 0.91$), values/goals ($\alpha = 0.86$), affect ($\alpha = 0.75$), cognitive/metacognitive strategy use ($\alpha = 0.90$) and resource management strategy use ($\alpha = 0.80$).

Data were collected by group administration of the instruments during three separate class sessions. The immediacy scale was administered first, followed by the professor/student rapport scale the next week and the MSLQ was administered a week later. All data were collected toward the end of the semester to allow students to have determined a perception of their instructor's immediacy and rapport.

Data were analyzed using the Statistical Package for Social Sciences (SPSS v. 19.0). Summated means were calculated for each of the constructs. An alpha level of 0.05 was set *a priori* for all analyses. For objectives one and two, measures of central tendency were used to report perceptions of immediacy, professor/student rapport, values/goals, expectancy for success, affect, cognitive/metacognitive strategy use and resource management strategy use. Objective three utilized canonical correlation analyses to determine the combined predictive value of the independent variable set (immediacy and rapport) on motivation and engagement. Two sets of canonical correlation analyses were run for this objective. The first analysis included the combined independent variable set paired with the dependent variable set of expectancy for success, values/goals and affect. The second analysis paired the independent variable set with cognitive/metacognitive strategy use and resource management strategy use. The dependent variables were grouped into two separate sets for analysis based on the division of the measured constructs into motivation and engagement. Hair et

al. (1998) stated that canonical correlations were the appropriate method for this type of research question.

Results

The sample (n = 306) was 63.7% female and had a mean age of 21.17 (SD = 2.86). Additionally, the majority of the sample was classified as Juniors or Seniors, 40.1% and 45.3%, respectively, followed by Sophomores (7.5%) and Freshmen (6.8%). The ethnic/racial breakdown of the sample was 63.2% White/Caucasian, 15.0% African-American, 12.4% Hispanic/Latino, 4.9% "Other" and 4.2% Asian. About 40% of the sample identified their major as "Other," which consisted of majors outside of CALS. Additionally, for this study CALS majors with a frequency of less than 10 were added to the "other" category. Other majors reported were: Family, Youth and Consumer Sciences (26.4%), Food Science and Human Nutrition (12.1%), Animal Sciences (5.5%), Biology (3.9%) and Agricultural Education and Communication (3.3%).

Objective one was to assess undergraduate students' self-reported perceptions of teacher immediacy behavior use and professor/student rapport (See Table 1). The summated mean for verbal immediacy was 3.57 (SD = 0.54) and the mean for nonverbal immediacy was 4.09 (SD = 0.43). The summated mean for professor/student rapport was 4.36 (SD = 0.53).

Similarly, objective two was to assess undergraduate students' self-reported measures of expectancy, values/goals, affect, cognitive/metacognitive strategy use and resource management strategy use (See Table 1). Results for this objective were: expectancy for success (M = 5.92, SD = 0.86), values/goals (M = 5.26, SD = 0.93), affect (M = 3.53, SD = 1.35), cognitive/metacognitive strategy use (M = 4.57, SD = 0.90) and resource management strategy use (M = 4.45, SD = 0.84).

Objective three was to determine the collective predictive value of teacher immediacy and professor/student rapport on students' self-reported values of motivation and engagement. Two separate canonical correlation analyses were run for this objective. The first compared the independent variable set (verbal immediacy, nonverbal immediacy and professor/student rapport) with the motivation variable set, while the second analysis compared the independent variable set with the engagement variable set.

Table 1. Descriptive Statistics for Immediacy, Rapport, Motivation, and Engagement

Construct	Range		M	SD
	Min	Max		
Verbal Immediacy[a]	2.25	4.75	3.57	0.54
Nonverbal Immediacy[a]	2.48	4.86	4.09	0.43
Professor/student Rapport[b]	1.65	5.00	4.36	0.53
Student Expectancies[c]	1.42	7.00	5.92	0.86
Values/Goals[c]	1.00	7.00	5.26	0.93
Affect[c]	1.00	7.00	3.53	1.35
Cognitive/metacognitive Strategy Use[c]	1.19	6.81	4.57	0.90
Resource Management Strategy Use[c]	2.26	6.89	4.45	0.84

[a]Likert-type scale (1 = Never to 5 = Very Often);
[b]Likert-type scale (1 = Strongly Disagree to 5 = Strongly Agree);
[c]Likert-type scale (1 = Strongly Disagree to 7 = Strongly Agree).

Results of the first canonical correlation analysis revealed that the full model, which consisted of a linear combination of the independent variable set and a linear combination of the dependent variable set (expectancy for success, values/goals and affect) was statistically significant ($\lambda = 0.611$, $F(9, 730.27) = 18.22$, $p < 0.001$). Sherry and Henson (2005) stated that since λ represents the variance unexplained by the model, the squared canonical correlation for the model (R^2_c) can be expressed by $1 - \lambda$, which explains the variance shared between the variable sets across all canonical roots. Thus, for this model, $R^2_c = 0.389$, indicating that 38.9% of the variance was shared by the immediacy/rapport variable set and the motivation variable set. The model yielded three canonical roots, two of which were significant. However only canonical root one was further explored as it accounted for 34.3% of the variance, while canonical root two only accounted for 6.9% of the remaining variance (see Sherry and Henson, 2005).

Table 2 shows the canonical correlation analysis between the immediacy/rapport variable set and the motivation variable set for root one. The table includes the standardized canonical function coefficients (b), the structure coefficients (r_s) and the squared structure coefficients (r_s^2). Conventions put forth by Sherry and Henson (2005) stated that structure coefficients above 0.45 ($r_s^2 > 0.2025$) indicate that a variable is a relevant contributor to the variable set. They reported that the squared structure coefficient is a measure of the variance an observed variable can contribute to its synthetic variable set. Additionally, Warmbrod (2003) suggested that standardized canonical function coefficients greater than 0.30 are important.

The dependent variable that contributed most to canonical root one was values/goals (b = 0.804, r_s = 0.967) where expectancy for success was the next most relevant (b = 0.308, r_s = 0.722). Values/goals and expectancy for success were both positively related to the dependent variable set. For the independent variable set, professor/student rapport contributed the most to the model (b = 0.724, r_s = 0.966). Additionally, professor/student rapport was positively related to the independent variable set and was a positively related to values/goals and expectancy for success. While verbal and nonverbal immediacy appear relevant contributors according to their high r_s values, their standardized weights are relatively low, which can occur as a result

Table 2. Canonical Correlation Analysis of Motivation Variable Set

Variable	Canonical Root 1		
	b	r_s	r_s^2 (%)
Student Expectancies	0.308	0.722	52.13
Values/goals	0.804	0.967	93.51
Affect	0.026	0.009	00.01
Verbal Immediacy	0.288	0.826	68.23
Nonverbal Immediacy	0.094	0.666	44.36
Professor/student Rapport	0.724	0.966	93.32

Note. b = standardized canonical function coefficient (weight); r_s = structure coefficient; r_s^2 = squared structure coefficient.

of multicollinearity among variables in a set (Sherry and Henson, 2005).

Results of the second canonical correlation analysis revealed that the full model, which consisted of the linear combination of the independent variable set (verbal immediacy, nonverbal immediacy and professor/student rapport) and the linear combination of the dependent variable set (cognitive/metacognitive strategy use (CMSU) and resource management strategy use (RMSU)) was statistically significant ($\lambda = 0.846$, $F(6, 604) = 8.78$, $p < 0.001$). Additionally, $R^2_c = 0.154$, indicating that 15.4% of the variance was shared between the independent variable set and the engagement variable set. Two canonical roots were significant for this model, however, only canonical root one was further explored as it accounted for 13.4% of the variance, where canonical root two only accounted for 2.3% of the remaining variance.

Table 3 shows the second canonical correlation analysis between the immediacy/rapport variable set and the engagement variable set. In root 1, CMSU ($b = 0.907$, $r_s = 0.995$) contributed the most to the dependent variable set and was positively related to the engagement variable set. RMSU had a substantial r_s value (0.736), but a low standardized weight ($b = 0.132$), which could be an indicator of multicollinearity among the variables. In the independent variable set, professor/student rapport ($b = 0.687$, $r_s = 0.951$) was the most relevant contributing variable followed by verbal immediacy ($b = 0.430$, $r_s = 0.861$). Both professor/student rapport and verbal immediacy were positively related to the independent variable set and CMSU.

Table 3. Canonical Correlation Analysis of Engagement Variable Set

Variable	Canonical Root 1		
	b	r_s	r_s^2 (%)
CMSU	0.907	0.995	99.00
RMSU	0.132	0.736	54.16
Verbal Immediacy	0.430	0.861	74.13
Nonverbal Immediacy	-0.038	0.601	36.12
Professor/student Rapport	0.687	0.951	90.44

Note. b = standardized canonical function coefficient (weight); r_s = structure coefficient; r_s^2 = squared structure coefficient.

Discussion

Several conclusions can be drawn from this study. First, participants in this study perceived that their instructors used both verbal and nonverbal immediacy behaviors often, however, they perceived nonverbal to be used more often than verbal. These results are similar to results found by Velez and Cano (2008), where nonverbal immediacy use was more prevalent than verbal immediacy behavior use among agricultural instructors. Nonverbal immediacy consists of behaviors, such as smiling at students, gesturing while talking and looking at the class while talking. The assumption can be made that these behaviors might be easier for instructors to implement than verbal immediacy behaviors, such as calling students by name, praising students work and using personal examples and humor while teaching. Additionally, Wilson and Taylor (2001) suggested that instructors' personalities may play a role in how much they utilize verbal and nonverbal immediacy behaviors. Future studies might include a measure of instructors' personality style to determine relationships between personality and immediacy behavior use.

One further consideration concerning immediacy is culture. Velez (2008) suggested that culture may play a role in how immediacy behaviors are perceived by students. This study was conducted in the college of agriculture at a large land-grant university in the Southeastern United States. Accordingly, the culture in other colleges, universities and different parts of the country may differ. Perhaps studies conducted in other locations might reveal divergent results concerning immediacy behavior use.

In addition, participants in this study agreed they have good rapport with their professors. Meyer (2009) suggested that instructors who utilize verbal and nonverbal immediacy behaviors should be more effective at fostering rapport than instructors who do not utilize immediacy. Wilson et al. (2010) reported positive relationships between immediacy behavior use and rapport and concluded that immediacy behaviors were not as inclusive of a construct as rapport. This might explain why rapport was reported at higher levels in this study than either of the immediacy behaviors. A determination of the relationship between immediacy behaviors and rapport is suggested for future studies.

For objective two, participants reported higher than intermediate levels of expectancy for success and values/goals, while they indicated intermediate levels of test anxiety (affect). Additionally, their levels of cognitive/metacognitive strategy use and resource management strategy use were intermediate. Ormrod (2008) suggested that expectancy for success is influenced by three factors: past successes and failures, communication of messages by others and accomplishments and failures of others. The classes sampled in this study were upper-level, major-specific courses or lower-level, introductory courses in agriculture, while the majority of participants were juniors or seniors. As a result, the participants in this study should know their capabilities according to their past accomplishments and failures. Perhaps this could help explain participants' levels of expectancy for success. Additionally, the reported levels of immediacy and rapport of instructors might indicate positive communication of messages is occurring between instructors and students, which could in turn influence students' expectancy for success.

Participants in the study also reported having high levels of values/goals for their courses. Eccles and Wigfield (2002) posited that three components contribute to how much a student will value a course including, interest, importance and future value. Since many of the courses in this study were upper-level, major specific courses, it is plausible that the participants had an inherent interest in the subject, in addition to realizing the importance and future value of the courses.

What is more, Pintrich and Zusho (2007) suggested that reactions toward an instructor can affect students' interest in and value toward a course. Given that the participants in this study reported generally good rapport with their instructors, perhaps reactions toward the instructor also contributed to the level of value students had for their courses.

Additionally, students in this study reported intermediate levels of self-regulated learning behaviors (cognitive/metacognitive strategy use and resource management strategy use). Typically students who possess higher intrinsic goal orientations use more of these strategies (Pintrich and Zusho, 2007). Since respondents reported high levels of goal orientation, it was expected that self-regulated learning behavior use would be higher. However, no distinction was made during the data analysis between intrinsic and extrinsic goal orientation; goal orientation was analyzed with values as one construct. Perhaps many of the students in this study were extrinsically motivated and thus did not use self-regulated learning strategies.

Objective three was to determine the combined predictive value of verbal immediacy, nonverbal immediacy and professor/student rapport on motivation and engagement. Results revealed the immediacy/rapport variable set was a better predictor of motivation than engagement. Professor/student rapport was the major contributor toward students' values/goals and expectancy for success, but had no relationship with affect. Additionally, verbal and nonverbal immediacy played a minimal role as predictor variables in this relationship. These findings align with prior research as rapport has been positively related to various aspects of student motivation (Wilson et al., 2010). Regarding the relationship between the independent variable set and engagement, professor/student rapport and verbal immediacy both contributed to students' cognitive/metacognitive strategy use. However, no relationship existed between the independent variable set and resource management strategy use. Furthermore, nonverbal immediacy did not contribute as a predictor of student engagement.

Results showed that professor/student rapport was the greatest contributor to the relationships with motivation and engagement. This finding is congruent with the conceptual model used in this study, which illustrated that professor/student rapport perhaps mediated between immediacy and the dependent variables. However, the results indicated a much stronger relationship existed between professor/student rapport and motivation than with engagement. This corresponds with Pintrich and Zusho's (2007) idea that motivation is the gateway to academic engagement. Future studies utilizing path analyses could help determine which variables mediate within this conceptual model.

Prior research has shown that teacher immediacy and professor/student rapport are positively related to student motivation and engagement; the results of this study concur with previous research. As a result, a few recommendations can be made. First, instructors should consider using verbal and nonverbal immediacy behaviors in their classroom, along with building rapport with students. The following practices could help instructors facilitate the rapport building process: 1) encourage more instructor-student interaction; 2) invite students to visit during office hours; 3) use personal examples in teaching; 4) call students by name; 5) get to know students and show genuine concern for students; 6) try to connect with all students, especially those who may not normally seek out a relationship with an instructor; and 7) show respect for all students. Additionally, instructors in colleges of agriculture might benefit from professional development that emphasizes the use of immediacy behaviors and rapport building. Furthermore, because student motivation leads to engagement, instructors should develop an understanding of the factors that affect student motivation, both intrinsic and extrinsic and implement practices in their classrooms that will help motivate students. Additionally, many students may not instinctively use self-regulated learning strategies, therefore students might benefit from instruction in how to regulate their learning.

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The World Food Situation

Earl L. Butz

Abstract

The world food situation is examined in detail, and there are concrete suggestions for developed and developing countries in meeting the world's food needs in the future.

We hear so much about the world's food and population problems that we sometimes lose sight of the very positive side of the global food outlook.

The world food situation has actually improved substantially over the last 20 years. The problems beginning in 1972 followed 20 years in which total world food production rose 70 percent and per capita food production rose 22 percent. Moreover, the world has the capacity to make further large increases in food production.

In 1972 we had record farm production in the United States. However, poor growing weather affected crops in the Soviet Union, Africa, Australia, the People's Republic of China, certain other Asian countries, and parts of Latin America. The protein supply was diminished by fishing failures off the coast of Peru. There was also a strong increase in demand around the world. Consequently, stocks were reduced.

In 1973, world food production resumed its upward curve. World output hit an all-time high, partly as a result of record grain and soybean crops in the United States. In 1974, however, the United States had its worst growing season in a generation. Late spring plantings, the worst summer drought since 1936, and early frosts in the Midwest all brought trouble for U.S. farmers. Canada and southern Asia also had poor crops.

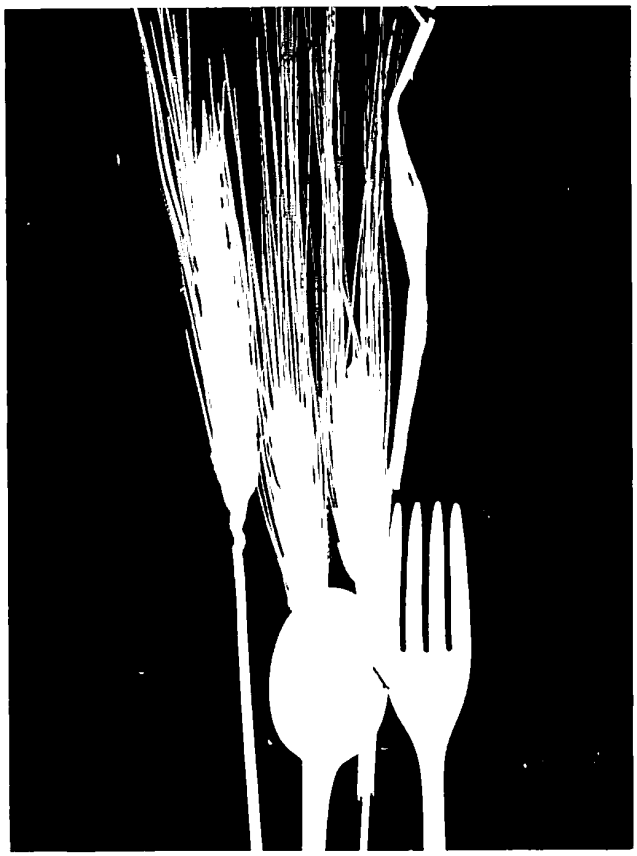
The resulting disappointment was in part a measure of the growth in demand and in expectations. In historical terms, the 1974 crops were large. The wheat crop was a record. The soybean crop was the third largest in history. Although the corn crop was disappointing, it was equal to crops harvested during the mid-1960s. Crops were better than average in the Soviet Union; reasonably good in Europe, Latin America, and the People's Republic of China; and definitely improved in most of Africa.

Overall, however, world food production was well below the 1973 record. World grain stocks, reduced by 1972 crop failures, moved still lower. The U.S. Department of Agriculture calculates that we will close out the 1975 crop year for the various grains with a total carryover of 90 million metric tons, compared with 148 million three years ago.

On an index of 1961-65 equaling 100, world per capita food production was 106 in 1974, 109 in 1973, and 105 in 1972. The largest increases were in developed countries, however. Production in less developed countries was 102 in 1974 compared with 104 in 1973 and 101 in 1972.(See Table 1.)

The reduction in world supplies was small as a percentage of world production, but it created hardships in some countries. This focused world attention on food problems. The Sahel region of Africa — the five or six nations in western Africa below the Sahara desert — experienced its fifth year of drought and poor crops. The Indian subcontinent, notably India and Bangladesh, had short crops. Other nations were hard-pressed to import enough food because of rising prices — and higher costs, especially for petroleum.

The developed nations did their best to respond to the most critical food needs. To help ensure that requirements were kept in balance, the United States initiated a monitoring system for exports of wheat, feed grains, and soybeans. Where nations were unable to cover their



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needs in the commercial market, concessional sales and food donations helped relieve the shortages. In cooperation with other donor nations, the United States continued to pledge food aid to the Sahel and Bangladesh. After first coming to the United States for food supplies through commercial channels, India signed an agreement for concessional sales of wheat through the "Food for Peace" Public Law 480 program.

The P.L. 480 program, as in years past, was the major instrument of U.S. food assistance. After operating for several years with a budget of about $1 billion annually, its budget for the fiscal year 1975 program was increased to $1.6 billion, providing for about 5.5 million tons of U.S. commodities. The program operates through two titles — Title I provides for government-to-government agreements for long-term, low-interest commodity loans; and Title II provides for commodity donations through multilateral, bilateral, and U.S. volunteer agencies. Title II programs fill the gap in emergency situations and in basic nutrition programs in the developing regions. Title I includes self-help provisions that help recipient nations improve their own agricultural productivity and economic development. Even the short-term programs designed to fill an immediate need recognize the importance of long-range development in increasing the world's capacity to feed itself.

Needed: Better Weather, Better Crops

While we are holding the fort through food aid programs such as P.L. 480, what we really need are a couple of good crop years. The U.S. policy has been to encourage U.S. production, and other nations are responding in a similar way. American farmers indicate they will increase acreages of wheat and soybens in 1975 and hold feed grain acreages at about the same level as 1974. With normal planting, growing, and harvesting seasons, this would give us appreciably larger crops than last year.

Crop projections for U.S. wheat range from 2.025 to 2.225 billion bushels, compared with the 1974 all-time record of 1.793 billion bushels. Soybean production could range between 1.45 billion bushels and 1.55 billion bushels, compared with 1.233 billion bushels in 1974. This year's feed grain crop could total in the range of 205 to 229 million tons, up sharply from the short 165 million tons harvested in 1974.

With U.S. trade accounting for over half of the world trade in these commodities, such a harvest would be a welcome addition to world food supplies.

However, it would be a tragic error to believe that the solution to the world's food problems lies in the U.S. Corn Belt and Great Plains, or in a world system of emergency grain reserves.

Table 1 Indices of World Population and Food Production, 1954-1974[1]

	World			Developed Countries			Developing Countries		
		Food Production			Food Production			Food Production	
Calendar Year	Population	Total	Per Capita	Population	Total	Per Capita	Population	Total	Per Capita
				(Index: 1961-65 = 100)					
1954	84.2	77	91	89.1	77	86	80.6	77	96
1955	85.7	80	93	90.3	81	90	82.5	78	95
1956	87.3	84	96	91.5	85	93	84.4	82	97
1957	89.0	85	96	92.7	86	93	86.3	83	96
1958	90.7	90	99	93.9	91	97	88.4	87	98
1959	92.4	91	98	95.1	92	97	90.5	89	98
1960	94.2	94	100	96.3	96	100	92.8	92	99
1961	96.1	95	99	97.5	95	97	95.1	94	99
1962	98.0	98	100	98.9	98	99	97.5	97	100
1963	100.0	100	100	100.1	99	99	99.9	100	100
1964	101.9	103	101	101.2	103	102	102.4	104	102
1965	103.9	104	100	102.3	104	102	105.0	104	99
1966	105.9	109	103	103.4	111	107	107.7	106	98
1967	107.9	114	106	104.3	115	110	110.4	111	101
1968	109.9	118	107	105.3	119	113	113.2	115	102
1969	112.0	118	105	106.3	117	110	116.1	121	104
1970	114.2	121	106	107.3	119	111	119.0	127	107
1971	116.4	126	108	108.3	125	115	122.1	129	106
1972	118.7	125	105	109.3	124	113	125.3	126	101
1973	120.9	132	109	110.3	131	119	128.5	133	104
1974	123.1	131	106	111.3	129	116	131.7	134	102

[1]World excluding communist Asia.
Source: Economic Research Service, U.S. Department of Agriculture.

The answer—and the challenge—is to increase food production in the less developed countries. There is no other way when only one-tenth of the food produced in the world moves between countries as trade or aid and the other 90 percent is consumed in the countries where it is produced.

There are many restraints on food production in most of the developing countries. These include inadequate research, shortages and high cost of fuel and fertilizer, inadequate storage and distribution methods, and lack of credit and capital. But standing at the top of the list is the lack of incentive for the farmer to produce more — the chance to make a profit by investing his time, effort, and what little money he might have with the thought of an economic reward.

Where, for example, is the incentive for the Thai farmer to produce more rice when his government buys his crop at one-fifth of the world price? Where is the incentive for a palm producer in Zaire to expand his groves when he knows that half his total output of palm oil must be sold domestically at a loss?

Help Others Help Themselves

Our task is to help the developing countries overcome these obstacles. We must help them learn to farm better; we must show them how to use technology; we must assist them in developing research to address their own problems; and we can try to persuade their governments that they can increase their production with more incentives for producers.

This will require the best efforts of all countries, developed and developing, but the potential is great.

Some agricultural economists in India, for example, feel that India can double food production within years with modest acreage expansion, a doubling of multiple cropping, and an increase of five times in fertilizer use and four times in the number of farm tractors.

In other parts of the world, there are big opportunities to expand production by doing more research and developing the indigenous crops raised by local farmers.

Hybrid corn varieties have been developed in low-income countries, but seed production methods and distribution systems preclude the widespread use of corn hybrids. Yields of sorghum are five times higher in the developed countries than in the less developed countries. Potatoes — the fourth most important crop in the world behind rice, wheat, and corn — are grown chiefly in the developed, temperate-zone countries and have never been fully exploited in the hungry countries. These anomalies must be eliminated from an undernourished world.

Livestock production also has great potential in tropical areas. Calving rates of beef cows in South America are only 40 to 50 percent — they are 80 to 90 percent in North America. Tropical Africa has around 300 million head of cattle, sheep, and goats — far below the potential production. Livestock can use large quantities of forage which otherwise would not be harvested.

There is an enormous opportunity to increase food production around the world, but it will take better use of technology, better farm management, improved marketing and storage, and above all, more effective incentives for the farmers themselves.

The key question in solving the food problem is not how to get more food to more people in emergencies — it is how to increase food production in the world, particularly in the developing world. Nor can we overlook the "population time bomb." There are probably adequate resources to handle world population through this century, but there comes a time when the food production potential of the earth will not sustain yet another doubling of consumers. This has to be considered along with long-term agricultural needs.

These longer-term needs were what Secretary of State Henry Kissinger had in mind when he proposed the World Food Conference for late 1974. And, despite the publicity sideshows that grew out of the conference, most of the 133 national delegations left Rome with the feeling that much of long-term value had been accomplished. Proposed in September 1973 at a time of record world harvests, the World Food Conference was intended to chart a long-term course for world food programs. With new production deficits occurring in 1974 — most importantly in the United States — the conference, by keynote time, had assumed a new air of urgency.

Secretary Kissinger, in his opening address, spoke of hunger as it has existed throughout history and said: "Our presence here is recognition that this eternal problem has now taken on unprecedented scale and urgency and that it can only be dealt with by concerted worldwide action."

At the end of 12 days of day and night sessions, delegates to the United Nations-sponsored conference had agreed upon 19 resolutions. They had issued a declaration, pledging national energies and resources to accelerate production growth in developing areas, improved distribution between countries, and to strengthen international mechanisms to coordinate and implement these efforts. Among its resolutions, the World Food Conference:

> **1. Recommended a goal of 10 million tons of grain per year, beginning in 1975, to serve as food aid, and scheduled a subsequent meeting in Rome to deal with more immediate problems.**
>
> **2. Endorsed a Food and Agriculture Organization (FAO) proposal for a new "undertaking" to establish a world network of national grain reserves, beginning with upcoming discussions of a proposed reserves coordinating group.**
>
> **3. Decided to establish a Global Information and Early Warning System on Food and Agriculture, and agreed that FAO is the most appropriate organization to supervise this system.**
>
> **4. Approved establishment of a World Food Council, with member countries to be nominated by the United Nations Economic and Social Council and elected by the UN General Assembly.**

In addition, the conference agreed with the proposition, stressed by the U.S. delegation, that the world must

move to a higher level of food production. I personally emphasized that: "We are not here to talk about what to do with less food. We are here to talk about what to do with more food."

Making Things Happen

Hungry people cannot, of course, eat resolutions. So it is fair to ask: "Just what is happening in response to the resolutions that came out of the World Food Conference?" The fact is that **much** is happening, and there is good reason to be encouraged over the speed with which follow-up actions are getting underway. I might mention some of the follow-up machinery that is being developed to implement the World Food Conference resolutions.

World Food Council. About 35 countries will be meeting soon to establish a World Food Council to be located in Rome. Dr. John Hannah, distinguished U.S. educator and agriculturalist, was designated by the UN Secretary General to head the work for the next six months and he will coordinate the efforts of the various UN family organizations.

Consultative Group on Food Production and Investment. This Group will concentrate on agricultural investment and increased food production to narrow the food gap in developing countries. Retired U.S. Ambassador Edwin Martin has been appointed chairman. He will have a staff drawn from FAO, the UN Development Program, and the World Bank.

Grain Reserves. An ad hoc grain reserves group met in London in February in conjunction with the International Wheat Council. All invited producing and exporting countries attended, and discussions were started on (1) what size food reserves are needed to give the world a reasonable degree of protection from production shortfalls, and (2) how the acquisition, the carrying, and the release of these stocks can be equitably shared.

Thus sincere efforts are under way to give meaning to the resolutions that came out of the World Food Conference. Whether the conference failed or succeeded can really be measured only after 5 to 10 years. If, by then, we have a better nourished, less hungry world, the conference will have served a useful purpose in focusing on one of the most important problems facing mankind and in bringing about international cooperation to cope with it.

A major conclusion of the World Food Conference was that international trade in food will play an important role in meeting the world food challenge, particularly in developing countries. Trade rather than aid accounts for over 90 percent of the movement of agricultural commodities.

The conference stressed the need for distributing food more effectively through elimination of barriers and trade restrictions by means of negotiations under the General Agreement on Tariffs and Trade (GATT). It was recognized that the extent to which trade barriers can be reduced and eliminated will largely determine the degree to which trade can contribute to meeting the world food challenge.

In the past, because of internal politics, governments often have been unwilling to consider substantive trade liberalization for fear that this would endanger domestic objectives such as maintaining income and stablizing food prices. Events have now demonstrated, however, that no government can, over a long period of time, isolate its internal markets from external forces. Today most nations recognize the need to develop understandings on the use of trade measures during periods of excessive or inadequate food production throughout the world.

Stimulus of World Trade

For American producers, world trade is the essential stimulus to expanded production and increased farm income. Foreign markets take more than half of the rice produced in the United States, nearly three-fourths of the wheat, half the soybeans, and as much as one-fourth to one-third of the feed grains. Farmers from Florida to Washington State depend upon foreign customers for their margin of profit.

For some countries, trade liberalization will mean greater dependence on imports. These countries want to be assured of access to supplies even when the situation is tight. On the other hand, supplying countries such as the United States cannot turn agricultural production on and off in response to stop-and-go actions by other countries, and they cannot promise full production without steady and secure access to foreign markets.

These are the highlights of the discussions that are now under way in Geneva, Switzerland, as the world's major importers and exporters gather to discuss world trade liberalization under the GATT. This negotiation, the first since the completion of the so-called "Kennedy Round" in 1967, involves more countries and a broader range of issues than any previous negotiations. The outcome may well set world trading patterns for the rest of the century.

The U.S. effort will be to improve market access for its producers, and to ensure importers of the reliability of the U.S. market. For U.S. farmers, with a $22 billion overseas market, the success of the multilateral trade negotiations in Geneva is a major necessity.

The challenge of feeding the world creates career opportunities of many kinds — in research, production, management, export-import, market development, distribution, information, and on down the line. Those who prepare today for careers in food and agriculture must keep in mind that the worldwide food situation will demand much from them. Agriculture is our nation's major renewable resource, and will likely play an even more important role in the future of this nation, especially in relations with other countries. American farmers will continue to feed not only this country, but millions overseas.

The American farmer and food are not isolationist; more than most other elements, those in American agriculture are a vital part of the world economy.

Transforming Conference Presentations into Involved Conversations: An Agro-ecology Model

Introduction

How many times have you attended a scientific meeting, listened to numerous lectures with little time for discussion and left the session convinced there was minimal communication or sharing of ideas? How often have you found it difficult to remember the content of the presentation, just a few hours or days after the meeting? How often have you left one of these meetings without even knowing the names of the people sitting next to you? At a conference of the International Farming Systems Association (IFSA) in Berlin in April 2014, we decided to catalyze an interactive session with brief presentations of a maximum of five minutes and to dedicate most of the time to discussion and generating further questions and ideas for action. The theme for instructors who presented papers was "Returning to the farming and food systems as they are – action and phenomenon-based learning as prerequisite for transdisciplinarity." The workshop was well attended, with spontaneous and exciting discussions, and resulted in excellent feedback from participants and an action plan. Here we share the background, planning, and implementation as well as evaluation of what could be a model for future interactive workshops for educators and a prototype for involved learning in the classroom.

Methods

Characteristic of planners for many professional meetings**,** the organizers of IFSA asked for submissions of papers for the conference and then organized these into 62 categories with a 90 minute session allocated to every four topics and 20 minutes for each lecture. We were given two sessions for the topic on action and phenomenon-based learning, with four lectures expected in each session. In consultation with the authors and with agreement of the organizers, we decided to have five-minutes for each presentation and ten minutes for discussion in small groups in a "world café" type setting (www:theworldcafe.com/method.html; Brown, 2004; Brown et al., 1997). Abbreviated titles for the topics included:

- Bridging the gap between academia and food systems stakeholders (Norway)
- MSc agriculture students working with ex-campus stakeholders (Denmark)
- Creating student confidence for communication with stakeholders (USA)
- Facilitating international education doctoral program in agroecology (Sweden)
- Action- and partnership-based PhD research (France)
- Engaging researchers with learning and innovation networks (Poland/Hungary)
- Experiential learning in a transdisciplinary setting (Germany)
- Transdisciplinarity as an emergent property in agricultural research (Australia)

In the middle of the first session of four papers, we, as moderators shifted the order of presentations to provide a more logical flow in the subject matter; this is adaptive management of the facilitation process, and workshop participants agreed with the change.

To facilitate the session with short presentations, and to create an alignment between the different presentations, the presenters were asked to design their short talk as a response to three questions:

- What is the essence of the approach you have used?
- What have been the positive outcomes thus far?
- What are the main lessons you have learned?

Most presenters followed these guidelines and were careful not to exceed the time limits. Seven of them used brief PowerPoint presentations, and one posted a hand-drawn diagram of the educational activity in front of the room.

The session was opened with the facilitators presenting the rationale for the workshop. Workshop participants were divided into small groups of three or four per table with ten minutes to discuss each presentation. The groups were shuffled between the two workshop sessions. Based on the assumption that one of the prerequisites for success in communication and building of a shared understanding, is that participants become acquainted, we invited short personal introductions at the outset. What they were asked to share was 1) where do you work, and 2) what have you done during the past six months that you are most proud of? Then after each presentation the small teams were asked to discuss two questions:

- What about the approach did you find new, useful, and exciting?
- What are the two questions you would like to ask the presenters?

After eight minutes of discussion, and an attempt to build a shared understanding around the two key questions, we asked each group to report briefly on their conversations. Although questions were raised for the presenters, there was no time for them to answer or elaborate. Our observation was that each group fully engaged the two questions, recorded their major points on A-4 sheets, and were enthusiastic and animated during this discussion period. The reports out to the larger group were varied and relevant. These reports as well as our evaluation of the process follow. A wrap-up of the sessions was planned to address three questions:

- What one idea am I taking home with me and why?
- What do I plan to do as a first step, and what are the details?
- Where can I find other sources of assistance, and what steps can the community take?

In fact there was not time for this wrap-up, but we asked people to quickly comment on the learning process in the two sessions, and to record their individual comments on papers that we collected, along with all the other notes from the groups. An action agenda was prepared by the conveners based on the general discussions and their observations. This agenda added to the workshop notes. These notes resulted in an eight-page summary that was sent within five days to all participants for comments.

Results

Among the lessons learned by participants and reported from the discussions were several on content and even more on the process in the workshop. Many comments centered around the topic of phenome-non-based learning and the need for more frequent and in-depth interaction with stakeholders. The importance of students being involved in practice on the farm was one key element. Another was building observation and reflection skills. One participant remarked that "structured reflection by students is rarely a part of the teaching agenda." The importance of scale was suggested as key to understanding systems, and this is a foundation for agroecology learning. One person designated this type of learning as "engaged scholarship," and further suggested that some things cannot be learned, only experienced, and thus the importance of experiential learning. Several participants pointed out that evaluation is really a critical part of the instructional process, and although we evaluate students and provide written and oral feedback as well as grades in a course, we are too often less concerned about evaluating the learning process itself. There were many more comments that resulted from this rich conversation following the talks, and these will be analyzed more carefully in another venue.

There were more comments about the process than on the content. There were positive remarks about the organization of the topics, the value of the short presentations and time for discussion, and the active and flexible facilitation of the two workshops. The low level of formality was noticed by several, and we established familiarity and a certain level of comfort by having all participants introduce themselves at the start of each session. This created an informal, though short-term, "learning community" with encouragement to fully participate and feel some ownership of the process. One person mentioned it was "*good to avoid the 'lecture-type' presentations and put weight on interaction, giving added value to the sessions.*" The five minute presentations were popular, helping speakers to "get straight to the point," urging participants to think about the essential take-home messages, and not investing valuable time pursuing interesting but probably marginal side issues. This was reflected in the intense conversations in the small groups, since they had only eight minutes to deal with two evaluation questions on each talk and two minutes to reach consensus. There was scarcely time for small talk or deviation from the topic at hand. Although the process and schedule may sound a bit "authoritarian," our experience is that when you have eight presentations and two ninety minutes slots, AND would like to have interactive conversations with everyone participating, then the sessions need to be carefully planned and managed by the facilitators. The response from participants was highly positive and there was respect for the leadership and facilitation model.

The action agenda summarized by the conveners included seven steps. These are being implemented by the conveners with collaboration of interested participants. Steps include:

- Circulate notes to all 16 participant to solicit edits, add comments, and keep the topics alive and encourage feedback
- Invite speakers to answer specific questions posed by the group in writing, and distribute the answers to all participants
- Provide participant evaluation comments to conference organizers to provide ideas for planning future conferences
- Survey authors to assess interest in developing a comprehensive article on their topics, and explore having a special issue of an education journal
- Develop a short article for the NACTA Journal on the workshop planning process and the results
- Perform a 'compare and contrast' evaluation of the eight papers in the workshop including comments from participants, and prepare a journal article
- Encourage IFSA to include workshops on active learning topics in future international conferences

The implementation of this action agenda will be catalyzed by the conveners, but we expect to share ownership and action with the entire group of participants.

Conclusions

Needless to say, as conveners of the two sessions, we were delighted with the reactions of the participants who provided highly positive feedback on both the topic and content of the workshops and especially on the process. Their active discussions during the café-type sessions following each presentation were productive and resulted in valuable sharing as well as written summaries of the conversations. The general comments on the conduct of the sessions provided in the last few minutes of the second workshop indicated that they thought this was a valuable learning experience and a model that should be used more often in scientific and educational conferences. At the danger of sounding self congratulatory, we as conveners reflected on the process and concluded that it was a great success. We think there is continuing activity and added value to the workshop because of the elaboration of an action plan, and the pursuit of workshop objectives far beyond the two 90-minute session in Berlin.

Many comments from participants were highly positive, and there was consensus that this model should be extended to the entire conference. One said, "Do it again, and I will join you people in this learning environment." Another remarked, "My paper is going to be presented in another workshop, which is obviously a mistake." A participant from Belgium reflected on the excitement of teaching, and wrote in his comments: "Thanks for a very nice workshop, full of life and joy." One scarcely hears either "life" or "joy" associated with learning at a meeting of professional educators! And in the words of a Danish agroecology instructor, "I came out of the workshop with much more energy than when I went in." What better testimonial could we have about success of this approach to a conference meeting?

In our subsequent reflections about the process of the workshop, we are exploring how a similar process could be planned and managed for the university classroom? Assuming that we can provide adequate stimulus and rewards for students reading relevant materials before coming to class, could we present a five-minute 'speed lecture' and pose appropriate questions that could be explored in small student groups? Each team could report back on their consensus about the topic and raise further questions, and the educator could briefly respond. It seems that we could structure a 45-50 minute class period to explore two topics in some depth using this model, and we are anxious to test this strategy in coming semesters.

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Collaboration between University Faculty, State Education Staff, and High School Teachers to Create Instructional Material: The Creation of Secondary Agricultural Communications Curriculum

Introduction

Today's high school agricultural science programs are required to teach a breadth of disciplines related to agriculture. As a result, high school agriculture teachers have reported a need for instructional material and specific skill development enabling them to improve teaching (Calico et al, 2013; Roberts et al, 2006). Therefore, it is critical for university faculty, state staff members and high school teachers to build collaborative relationships to educate and prepare high school students for a future in, or as a supporter of, agriculture. By capitalizing on curiosity piqued through innovative technology presented to secondary students, teachers can present knowledge and skill development activities to engage students in more meaningful learning.

Procedure

The most recent National Research Agenda for agricultural education and communications identified priority areas important to visual communications curriculum and training in secondary education programs: (a) sufficient scientific and professional workforce that addresses the challenges of the 21st century (priority area three); (b) meaningful, engaged learning in all environments (priority area four); and (c) efficient and effective agricultural education programs (Doerfert, 2011). The need for agricultural communications curriculum is evident and supported by teachers and students (Calico et al., 2013). Quality instructional material made available to instructors will create interest and career opportunities in agricultural communications for students in the future (Doerfert, 2011).

As agricultural communications becomes a more prominent area of the industry, it is important for post-secondary institutions to work with secondary agricultural education programs to build student interest in agricultural communications. With collaboration from a secondary agricultural education teacher advisory board, comprised of Arkansas agriscience teachers, and the Arkansas Career and Technology Education Department, agricultural communications curriculum was developed by faculty and staff, with expertise in agricultural communications and agricultural education. Instructional materials incorporate the theory of constructivism and direct instruction along with both experiential and authentic learning to foster an engaging learner experience. Through class discussion, group

projects and evaluation, students participated in research and presentation opportunities to gain real-world skills to create awareness for college and career opportunities post high school graduation (Calico, 2014).

Additionally, the graduate assistant responsible for curriculum development traveled to high school agricultural programs and educational cooperatives across the state recruiting for the Department of Agricultural Education, Communications and Technology at the University of Arkansas and facilitating inservice opportunities for teachers interested in learning more about the agricultural communications curriculum and skills needed to teach the agricultural communications curriculum material confidently.

Assessment

The collaborative effort between university faculty, state staff members, and secondary agriculture teachers to develop agricultural communication curriculum resulted in:

- An increase in student knowledge and skill development in areas of agricultural communications desired by employers in the field and necessary for success in pursuit of a degree in agricultural communication post high school graduation (Akers, 2001; Calico, 2014)
- An increase in secondary agriculture teacher's confidence and enthusiasm in teaching and promoting agricultural communications in their agricultural education program (Calico 2014).
- A working relationship between university faculty, state staff members, and secondary agriculture teachers. This relationship provides quality education for students in high school and a collegiate link for students interested in pursuing agricultural communications as a career of study post high school graduation.

Collaboration between university faculty, state staff members, and high school teachers should be utilized to create quality instructional material and resources for other non-traditional secondary agricultural courses. Expertise from faculty in university departments specific to the curriculum being developed should be contacted from collaborative efforts. An example of this is the Food Science course taught in numerous high school agriculture programs across Arkansas. Teachers currently rely on curriculum frameworks developed for Family and Consumer Science to teach the course. University faculty from the Food Science Departments at University of Arkansas should work to developed food science curriculum in collaboration with state staff and secondary agriculture teachers. There are many other applicable areas of study that would add value to the secondary school system both in and outside the state of Arkansas. We encourage all post-secondary agricultural faculty and departments to work with their high school agricultural programs to assist teachers with content specific curriculum development. This opportunity serves as both an educational and recruitment activity that can add value to post-secondary institutions across the U.S.

Additionally and in cooperation with the Department of Career and Technical Education, teacher inservice training should be scheduled to introduce secondary teachers to newly developed curriculum, software, and equipment, and to increase their confidence in teaching the content. Representatives from the collaborating university should continue to interact with secondary agriculture teachers and prospective students to further educate both students and teachers on opportunities within areas of agriculture they may not be familiar with.

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Personal Biographies Used to Build a Learning Community

Learning is a social activity and enhanced when students are in a supportive environment (Johnson and Johnson, 1989). Providing the space and opportunity for students and faculty to become well acquainted is essential in the first steps of building a learning community. In workshops, courses on campus, and distance or blended courses, we have found that creating comfortable avenues for communication and building confidence can be achieved by students preparing and presenting a short personal biography of their experience, prior courses, personal interests,

and motivations for participation in the particular educational activity. Sharing a personal biography is also an opportunity for the instructor to provide more background on her/his career beyond the typical resume of degrees, fields of study, and prior teaching or research experience. We have found that this space and opportunity provides a rapid and somewhat in-depth resume of what each person brings to the class, and is a good first step toward community building (Wiedenhoeft et al., 2003).

Learning Objectives for starting a class with personal biographies include: 1) providing space for people to learn about each other's prior classes, as well as professional and life experiences in order to build interpersonal interactions, 2) giving instructors a general overview of the composition of the class as well as individual expectations, 3) involving each individual in a presentation that can build ability to communicate and self-confidence, and 4) giving students a window on their instructors' backgrounds, expectations, and world views. Often students recognize shared interests with others that could easily remain undetected during a week-long course or an entire semester.

Methods can range from simple introductions of name, major, and expectations, with students and instructors sharing around a circle during the first class meeting. We have found that these are often cursory, provide only the scarce facts, and lack creativity, ie. the rank and serial number approach. A more robust approach is to provide a more in-depth introduction using visuals such as a flip chart of 50 x 80 cm paper and wide markers of various colors with instructions to write, draw, or otherwise illustrate individual backgrounds, experiences, and other information relevant to the course. As a basic minimum, we request name, major, home town or state or country, what each person brings to the course that will be useful to others, and expectations for the course or workshop. We generally provide up to 10 minutes for everyone including instructor(s) to prepare their biographies before they present their resumés to the learning community. Biographies could be posted around the wall of the classroom, and left up for at least that day or the first week so that people can get better acquainted. In short workshops, they may be posted and left in place if appropriate space is available.

Outcomes of this initial class or workshop exercise include 1) an in-depth acquaintance with other students or participants, 2) some familiarity with the background and interests of the instructor(s), 3) the breadth of experience represented by the people in the community, and 4) the diversity of expectations for the course.

The community building that can be achieved by personal biographies presented at the start of a course can be supplemented by activities outside the class, such as time together during travel, at meals, and informal sports or cultural events shared by the students and instructors. When students learn about the professions and backgrounds, courses, and research experiences of others, it becomes much easier to connect and to ask specific technical questions about areas in which they may need information. Students with strong experience in soils, for example, have organized evening seminars to help bring peers up to speed on this topic. Knowing more about personal backgrounds can bring people together around common interests. For example in one course in Estonia, half of the participants had dogs at home as pets. This provided a rich context for extra-curricular discussions. One method used in longer courses is the community potluck supper, which can be organized around dishes prepared by everyone that represent their family, culture, or ethnic background, or around dishes made from only local ingredients. Another is to schedule waffle breakfasts with small groups of students together with local residents, held in a faculty home, to introduce students to a new culture. This has been especially useful in an international agroecology course in Norway (Francis et al., 2011).

For instructors, another outcome of the personal biographies is a more in-depth knowledge base about the backgrounds and capabilities of the participating students. This is often used as one criterion for forming student project teams, as we build groups that are diverse in academic majors, work experience, gender and age, and complementary knowledge and skills. Some of this can be gleaned from the application information or from pre-course essays submitted to the instructors, but a much broader picture including personality traits generally emerges from the biography exercise.

One key objective of most academic courses is building confidence and experience in oral communication skills. The ability to quickly summarize one's background into a summary biography requires a degree of synthesis of many years of experiences, and a need to quickly decide what is really important to share with the class. Although we observe that some students are quite nervous when first sharing in the whole group, the presentations help to establish a level of trust and acceptance that we are all in the learning landscape to undertake a shared journey, and all will contribute and learn from the experience.

Although students may have known their instructors from previous classes or reputations on campus gleaned from other students, the faculty is often perceived as a group of experts in forages, plant breeding, prairie ecology, or agronomic practices. Seldom have they been viewed as 'whole people' who also have a rich background of study, field experience, and interests outside their job. Learning about their instructors through the biographies – including family histories, job experiences, international travel and professional activities, hobbies – students begin to build a level of trust in the faculty now seen as 'real people' with both the joys and the challenges that all of us have. One of us (C. Francis) has shared the personal family tragedy of losing a son to suicide when this promising young person was 22 years old; a story that has a powerful impact on students of about the same age and an experience that has motivated this instructor to quality teaching and

to the recognition of the importance of education and building confidence in the next generation. Although this is a rather extreme example of transparency, it is an illustration of one way to connect with students and reinforce the importance of every course they take – especially those where success depends on mutual trust and sharing.

In summary, we have found that sharing of personal biographies among students and instructors has been a powerful first step in creating a trusting and sharing learning community. This process has been used in conventional classes that will convene for an entire semester, in full-time classes that may last from one week to sixteen weeks, and in other group venues where it is important to quickly establish rapport and shared understanding. Some have suggested that this is a large investment of time – for example spending an entire 50-minute class period in a semester that includes only 45 classes – yet when success in a course depends on well-functioning teams working on projects and productive sharing in class discussions, we have found this to be a priority activity. In short courses of one week, this is a good way to jump start the course and demonstrate to students that they are important and that their information and experiences will be a key resources to be shared during the course. We strongly recommend that instructors try this type of class building exercise and to report their results as related to achievement and future value to students.

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