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From the Executive Editor

I am pleased to publish the first issue of Volume 20 of *JIAEE*. This issue includes four feature articles related to unique programs conducted in Caribbean and Iraq. In a few months you will have the opportunity to attend the annual meeting of AIAEE in Ft. Worth, Texas. Don't forget to register. We hope you will be there, but if not, abstracts of all research presentations and posters presented at the conference will be published in the summer issue, Vol 20 (2) of *JIAEE*.

Also in this issue is the call for a new Managing Editor for *JIAEE*. A huge thanks goes to Dr. Amy Harder of the University of Florida for her excellent efforts in managing the submissions and reviews for the journal. If you are interested in this position, please follow the directions provided for application.

The issue of the number and availability of qualified reviewers for *JIAEE* continues to be a concern. It is a privilege AND a responsibility to serve as a reviewer for *JIAEE*. Dedicated, qualified reviewers are needed who will not only accept the assignment, but review responsibly and complete in a timely manner. As members, this is your journal. Your help is needed.

Sincerely,

Brenda Seevers
Executive Editor, *JIAEE*

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Access to Agricultural Inputs, Technology and Information, Communicating with Farmers, and the Role of Women in Agriculture: Perceptions of Iraqi Extension Agents

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Abstract

The goal of this study was to gain a more comprehensive understanding of access to inputs, technology and information available to Iraqi extension agents, and to ascertain current farmer communication strategies and gender roles within the diverse Iraq agricultural extension system. The conflicts, government policies, and economic sanctions that have enveloped Iraq over the last several decades have significantly impacted access to agricultural resources. Iraqi extension personnel participating in the Iraq Agricultural Extension Revitalization (IAER) program provided their perspective on the availability of agricultural supplies, technology and related information. About two-thirds of the extension agents indicated that the flow and availability of agricultural supplies has become less restricted and generally felt that there was greater access to basic agricultural information compared to the previous decade. Despite perceiving noticeable improvement overall in access to agricultural supplies and technology, over 83% of the program attendees agreed that access to agricultural inputs was currently insufficient to successfully promote productive agricultural practices. An overwhelming preference for face-to-face communication by both farmers and extension personnel also limits the extent to which agricultural information can be disseminated. In addition, several regional and gender-based differences emerged. Notably, it appears that farmers do not approach female extension personnel equally, wherein better educated farmers are more likely to interact with female extension agents. We suggest that an approach based on a horizontal exchange of knowledge between extension personnel and local farmers, coupled with a better integration of women extension personnel, will help a revitalized Iraqi extension system achieve greater agricultural sustainability.

Key words: Iraq, International Agricultural Extension, Resource Availability, Sustainable Agriculture, Gender Issues

Introduction

The Iraq Agricultural Extension Revitalization Project

Effective agricultural extension systems often form the cornerstone of information and technology transfer to farmers. Although Iraq has an agricultural extension system in place, extended conflict has greatly reduced its operational capacity. An effective agricultural extension system can help revitalize the farming sector and encourage long-term agricultural sustainability. Training sessions for Iraqi extension personnel have been supported by organizations such as the United Nations and various countries (e.g., United States and Australia). The USDA-funded Iraq Agricultural Extension Revitalization (IAER) program was one such effort. This project aimed to train Iraqi extension professionals to better deliver information to farmers in their communities. Participation in the IAER program allowed U.S. university personnel to interact with Iraqi agricultural extension agents to gain insight into obstacles they may face while revitalizing the agricultural sector in Iraq. The goal of this study was to gain a more comprehensive understanding of access to inputs, technology and information available to Iraqi extension agents, and to ascertain current farmer communication strategies and gender roles within the diverse Iraq agricultural extension system.

Current State of Agriculture in Iraq

Agricultural production occupies about 9.5 million of Iraq's 43.7 million ha and represents the second largest contributor to the national gross domestic product

(GDP) (USAID, 2006). Agriculture also serves as a pivotal component of the rural social structure. Iraq is agriculturally and geographically diverse. The landscape ranges from the rich alluvial plains of the southern Tigris–Euphrates valley to mountainous areas in the Kurdistan Regional Government (KRG). Dryland small grain cultivation (principally wheat and barley) makes up much of the agricultural activities in the north. Cereal, vegetable, tree fruit, and vine production (particularly dates, figs, grapes, and olives) predominate in the central and southern irrigated zones (Shnepft, 2003).

Each region exhibits limitations to agricultural productivity, although water scarcity is prevalent across much of Iraq. Desert composes 40% of Iraq's land area. Semi-nomadic agro-pastoralists inhabit these desert regions (EIU, 2007). The Jazira Plateau covers about 20% of Iraq. This region contains much of the country's arable land, but it regularly experiences drought conditions. High soil salinity often compounds arid conditions in the southern and central portions of the country. The foothill agro-environments in the KRG receive moderate rainfall but commonly exhibit poor fertility. This agricultural and geographic diversity demands a staff of well-trained extension personnel capable of meeting the many and varied needs of Iraqi farmers.

Iraq's food production systems have declined over the last several decades. Wars, government policies and economic sanctions reduced the diversity of Iraq's agricultural infrastructure (USAID, 2006; EIU, 2007). For instance, Iraq operated three seed companies producing a total of 80,000 metric tons of seed per year prior to economic sanctions in the 1990s (Bishay, 2003). However, shortages of many seed varieties, poor seed quality, and inadequate knowledge about varieties now exist (Iraq Ministry of Agriculture – Karbala, personal communication, 2011). Additionally, fertilizer is often in short supply. Agricultural equipment, when available, is often old or ill-suited to diverse farm systems (USAID, 2006). Soil erosion and removal of crop residues for animal feed have depleted soil organic matter. Excessive tillage has also contributed to the physical degradation of soil structure (Bishay, 2003). Soil salinity has increased due to a lack of high quality water and irrigation equipment, and overall poor water management. Many people have left rural areas, which has led to labor shortages in traditional farming regions. This exodus further exacerbates the decline in local knowledge of diverse farming systems and contributes to reduced agricultural productivity (Shnepft, 2003).

The Iraq agricultural sector requires revitalization to ensure sufficient food. Currently, 80% of Iraq's food is imported from neighboring countries (McChesney, 2008). Agricultural production has begun to increase since the U.S. occupation of Iraq. However, disturbance of the previous food distribution system limits food availability to some Iraqi citizens. This situation has contributed to increased childhood malnutrition over the past decade (Picotte & Campbell, 2010). Food aid from the international community can help overcome this issue. However, Iraq needs to avoid developing dependency on aid, as Hafer et al. (2011) warned in an assessment of post-conflict agricultural development in Iraq. Iraq has a long history of food surpluses and has the potential capacity of overcoming this dependence on international food aid and imports. Revival of the agricultural sector is important to guarantee food security for the country.

Purpose and Objectives

Limited literature exists regarding agricultural extension in Iraq that is written

in English. Thus, this study aimed to gain insight into the perceptions of Iraqi extension agents to better understand the challenges they face. This information can be used to enhance future international training efforts for Iraqi extension personnel. The first objective of this study was to assess the availability of basic agricultural inputs and new agricultural technologies in Iraq. A second objective was to investigate access to agricultural information and the needs for more training on different topics. The results of these objectives provide a perspective on the current agricultural infrastructure and perceived changes in access to agricultural resources over the last ten years. A third objective was to evaluate communication strategies used between extension agents and farmers in Iraq. A fourth objective was to examine the role that women play in Iraq agriculture. A separate training session for female extension agents presented an opportunity to evaluate survey responses in a gender context. The results obtained for each of these four objectives are based on the responses of the Iraq agricultural extension agents participating in the IAER program. The data given here are useful because they present the perceptions of Iraq extension agents, which can vary from information available through other sources.

Methods

The Iraq Agricultural Extension Revitalization (IAER) Program

The USDA funded the IAER program with the primary aim of training Iraqi extension professionals to better deliver information to farmers in their communities. This goal was intended to help Iraq approach previous levels of agricultural self-sufficiency (Abi-Ghanem et al., 2009). Principal to the IAER program, five U.S. land grant universities performed training sessions for Iraqi extension agents. Texas A&M University (TAMU) played the lead institutional role in the IAER program. Four other land grant universities composed the rest of the team: Washington State University (WSU), the University of California, Davis (UC Davis), New Mexico State University (NMSU), and Utah State University (USU). Each university held multiple training sessions in the Middle East on select technical topics. A training event consisted of 25 to 30 Iraqi Ministry of Agriculture (MoA) personnel taught by two to five university faculty members and/or extension agents for ~6 days per session (Abi-Ghanem et al., 2009). Each university offered training on a primary focus topic: dryland agriculture (WSU), horticulture (UC Davis), extension methods and marketing (NMSU), livestock management (TAMU), and irrigation (USU). Additional training sessions taught effective extension teaching methods.

A total of 44 training activities occurred over the duration of the IAER program, reaching 720 trainees. This study focuses on five of these training sessions conducted by WSU from 2008 to 2011. The first session occurred in January, 2008 at the International Center for Agricultural Research in the Dry Areas (ICARDA) near Aleppo, Syria. This session involved 29 trainees (25 men, 4 women). Featured topics concerned soil fertility, on-farm experimental design, composting, and crop variety testing. The second session involved 26 women selected by the MoA to participate in an all-women's session held in Amman, Jordan in June, 2008. This special session intended to increase women's roles in Iraq's agricultural redevelopment. This training addressed sustainable agriculture, composting, food safety, and scientific communication. This paper hereafter refers to these two sessions as the "mixed-gender" and "women's" sessions. MoA identified the topics based on interest indicated by internal

surveys and apparent needs. Subsequent IAER sessions occurred in Erbil (May, 2010 and February, 2011) and Dohuk (June, 2011), KRG, Iraq. This paper refers to these as the KRG sessions. These trainings, conducted by WSU, UC Davis, and TAMU, included extension agents from KRG. Open-ended interview responses conducted during the KRG sessions supplement the survey data in this study. Surveys were conducted during these sessions to collect information on participant satisfaction with the training, their level of learning, and future training needs (Abi-Ghanem et al., 2009). The surveys also addressed access to agricultural resources in Iraq and provided data on the extension personnel in regional and gender contexts.

Surveys

Iraqi trainees completed questionnaires to assess perceived views on the Iraqi agricultural sector during the WSU sessions in Syria and Jordan. Participants completed the same survey in each session. The survey was designed according to Brace (2004) and included 17 questions about the current state of agricultural extension in the respective Iraqi regions. The questionnaire was developed based on a literature review and personal interviews with Iraqi extension personal during previous IAER sessions. Question design intended to adequately assess trainees' perceptions of the agricultural infrastructure and changes that may have happened over the prior ten years. Specifically, the assessments regarded access to basic on-farm inputs, new agricultural technologies, related information (including the use of traditional and novel methods of disseminating information), and the role of women in agriculture.

Logistics prevented the possibility of follow-up surveys. However, the study considered qualitative reliability and validity. An organized review of survey content tested content validity, internal validity, and external validity to ensure suitable and appropriate material was presented. Questions were direct, phrased in a positive way, and posed in Arabic. The study assessed reliability by checking for internal consistency by using different question types, including multiple choice, fill-in-the-blank, and yes/no formats. This study pooled survey results from the two sessions for general use to improve sample size. References to specific demographic groups were made accordingly (e.g., based on region). Personal interviews of the Iraqi extension personnel by WSU agents supplemented the questionnaires. Personal interviews conducted during the KRG sessions provide additional data. In addition, the KRG session interviews gained information on the situation facing the Iraq extension system.

This study has a limited sample size and does not fully represent the status of Iraqi agriculture or the extension system. However, the data gained from working extension agents from throughout Iraq provides valuable insight due to the lack of other existing information on their perceptions. Also, one should note that data was collected during a time of shifting turmoil and politics. The situation in Iraq is dynamic, and information may become outdated over time. Still, consistency was observed in responses from the Iraqi extension agents between the 2008, 2010, and 2011 training sessions used in this study. Moreover, extension agents from developed nations working in developing nations (particularly after a period of conflict) can gain an awareness of situations they may encounter.

Results and Findings

Gender, Geography, and Educational Background of Iraqi Extension Agents

The distinct regions and populations of Iraq necessitate consideration of the demographics exhibited by the IAER participants. While all of the attendees in the women's session were female, the mixed-gender session was 86% male and 14% female. For both sessions, about half of the participants were from the KRG, with the remainder from other Iraqi regions. This division reflects the existence of two separate MoAs in Iraq. One is headquartered in Erbil to represent the KRG, and the other is located in Baghdad to primarily represent the non-KRG governorates. Southern Iraq, incorporating the governorates of Al-Muthanna, Dhi Qar, Maysan and Al-Basrah, had the lowest representation at 12 to 13% of trainees in each instance. The sessions displayed distinct age differences. Fifty-two percent of the women's session was 20 to 30 years old, and none were above 50. Fifty-five percent of the mixed-gender participants were 30 to 40 years old, with 15% over 50. Educational backgrounds in each session differed as well. Bachelor of science (BS) degrees in agriculture were held by 87% of the trainees in the mixed-gender session. However, only 62% of the women's session had a BS degree, while 31% possessed a technical degree.

Access to Agricultural Inputs and Technologies

A critical component to the success of extension trainings is determining the perceived access of the extension agents to agricultural farm inputs and supplies and new technologies. Survey results show that the flow and availability of agricultural supplies and products has become less restricted compared to the previous decade. However, further improvements are still required. Sixty-three percent of the participants indicated greater access to agricultural inputs, such as seed and fertilizer, in 2008 than in 1998 (see Table 1). About a quarter of the participants denoted diminished access to inputs in 2008 versus 1998. A majority of such respondents were from central Iraq, where 47% felt fewer resources were available, compared to 41% who felt more resources existed. Despite perceiving noticeable improvement overall, 83.6% of the program attendees responded that access to agricultural inputs was currently insufficient to successfully promote productive agricultural practices. No significant deviation in responses occurred between women and men with regard to either changed access to basic agricultural inputs or the needs for greater availability.

Table 1. Perceived Changes in Access to Basic Agricultural Inputs and New Technologies in Iraq Based on Region Between 1998 and 2008 (n = number of respondents)

	Access to basic agricultural inputs compared to 10 years ago			Access to new technologies compared to 10 years ago		
Region of respondent	More	Similar	Less	More	Similar	Less
South Iraq (n = 7)	5	0	2	4	0	3
Central Iraq (n = 17)	7	2	8	7	4	5
Kurdistan (n = 28)	20	4	3	7	7	10
Total	32	6	13	18	11	18

Note: Twenty-eight (28) surveys were returned for the Jan. 2008 mixed-gender session (including one by an administrator) and 24 were returned from the June 2008 all-women's session. Question totals do not equal survey total (52), because respondents either made no selection or marked two answers, leading to the entire response being discarded.

Regional differences in responses were found between extension agents from Kurdistan and southern Iraq compared to those from central Iraq. Face-to-face discussions with participants revealed several possible reasons for these differences. Some of the trainees claimed international sanctions imposed on Iraq from 1990 to 2003 significantly restricted the flow and availability of agricultural supplies and products. Southern Iraq, especially in the areas surrounding Basra, possessed advanced vegetable and crop production practices prior to sanctions, which declined thereafter. Earlier reports noted a shortage of equipment in southern Iraq (FAO, 2003) and more than half of the tractors are allegedly at least 15 years old. However, the participants indicated that most farms in southern Iraq increasingly have timely access to improved equipment. Meanwhile, more negative responses from the central Iraq trainees may stem from the end of region-specific policies that existed under the previous regime. The extensive strife from 2003 to 2008 exacerbated problems in the dispersal of agricultural supplies in the central Iraq region.

Kurdish responses generally suggested a feeling of increased access to agricultural inputs over the last decade (74, 15, and 11% of the Kurdish participants denoted more, similar, and less resource access, respectively). This response is interesting, because there has been an overall decrease in international support over the last decade. Agriculture was promoted and well supported with new technologies from both the KRG government (which received autonomy in 1991–1992) and international organizations from 1997 to 2003. However, foreign entities abandoned their programs in 2003, preceding the war. These survey results imply that this transfer of support from largely international to domestic sources has not disrupted resource dispersal in the region. Individual interviews with Kurdish extension agents during the KRG sessions expressed that much of this transfer has come through increased efforts by the private sector.

Participants disagreed markedly regarding access to new technologies (see Table 1). An equal number of respondents (38%) believed that access was more available as believed that it was more limited. Twenty-three percent indicated no perceived change. When viewed by region, a greater proportion of those from south and central Iraq denoted increased access to new technologies. Kurdish representatives more frequently designated that new technologies were exceedingly limited during the period in question. The influx of international aid after KRG autonomy and their subsequent departure could offer an explanation for this disparity. More notably, a distinct gender difference emerged. While 58% of those at the predominately male session indicated greater availability of new technology, 57% of the all-women's session denoted access has decreased. The proportion of participants who were Kurdish was greater among women than men, which may have contributed to this discrepancy. Also, many of the women were new university graduates exposed to more advanced technologies. Their recent education may have unrealistically raised their expectations for access to new technologies.

Access to Agricultural Information

Another important component to extension training sessions is to consider the availability of scientific agricultural information to Iraqi extension agents. Iraqi extension personnel generally indicated that both they and the farmers they worked with had more access to basic agricultural

information in 2008 compared to 1998. Exceptions included some farmers in central Iraq (Salaheddin and Baghdad) and KRG (see Table 2). In central Iraq, conditions remained unstable at the time that the survey was conducted. It was considered unsafe for extension personnel, particularly women, to visit farmers and distribute information in certain locations. This situation may have generated perceptions held by extension agents in these areas that they and their respective client farmers had less access to information.

Table 2. Perceived Changes in Access to Agricultural Information by Extension Personnel and Farmers in Iraq Based on Region Between 1998 and 2008 (n = number of respondents)

	-------- Access to agricultural information compared to 10 years ago --------					
	for extension personnel			for farmers		
Region of respondent	More	Similar	Less	More	Similar	Less
South Iraq (n = 7)	7	0	0	5	1	1
Central Iraq (n = 17)	12	2	3	13	2	2
Kurdistan (n = 28)	21	4	2	16	3	6
Total	40	6	5	34	6	9

Note: Twenty-eight (28) surveys were returned for the Jan. 2008 mixed-gender session (including one by an administrator), and 24 were returned from the June 2008 all-women's session. Question totals do not equal survey total (52), because respondents either made no selection or marked two answers, leading to the entire response being discarded.

Participants in both initial sessions agreed that increased agricultural education for farmers is needed in Iraq. Ten topics were identified as important by over half of the trainees (see Table 3). Plant protection was the most commonly listed response, with over three-quarters of the extension personnel asserting this was a critical area requiring more education. Fruit and vegetable production, machinery use and repair, row crop production, weed control, and soil fertility represented other high priority items. The KRG sessions identified similar findings. No clear regional differences emerged from the results. While women indicated the same priorities (listed in a slightly different order), the overall percentages were noticeably lower. This finding suggests that other topics not listed are important to women. Open-ended questions during training also revealed soil salinity, seed production, and deforestation as major concerns.

Table 3. Agricultural Educational Topics Identified by Iraqi Extension Personnel as a Critical Need for their Respective Regions (n=55)

Topic areas	Percent (%) response
Plant protection	76.4
Fruit and vegetable production	69.1
Machinery use and repair	67.3
Row crop production	63.6
Weed control	63.6
Soil fertility	61.8

Livestock management	56.4
Farm financial management	56.4
Soil management and erosion control	52.7
Biological control of pests	50.9

The educational topics identified by trainees during the IAER program tended to target specific issues and did not involve more holistic perspectives. Shinn & Briers (2009) noted the need for more robust rapid rural appraisals in Iraq. The U.S. IAER trainers during the KRG sessions drew similar conclusions. It also was apparent from the KRG sessions that Iraqi extension agents require more education regarding general extension methods that incorporate aspects of needs assessments, program development, program planning and delivery, and evaluation. This observation corresponds with an evaluation of the Department of Agricultural Extension at the University of Baghdad (Briers, Balschweid & Al-Ajeeli, 2012). That assessment found that agricultural extension faculty follow an outdated curriculum and lack practical extension experience. The extension agents in the Dohuk session stated similar experiences during their schooling. When appropriate, future extension training sessions in Iraq should present specific topics into a comprehensive educational program. This approach will provide a more robust background for Iraqi extension agents so they can address the numerous issues facing agricultural production.

Communication with Farmers

According to all trainees, farmers in Iraq greatly prefer to obtain information through face-to-face interaction with extension personnel. The extension agents also preferred this method to disseminate agricultural information (see Table 4). This finding is largely due to limited access to the internet and written materials. Interviews during the KRG sessions indicated that the lack of a postal service in Iraq and illiteracy rates among farmers in specific areas further limited dissemination options. Iraqi extension personnel generally reach more farmers through workshops and on-site demonstrations than through written or electronic materials. The results were similar across regions and gender. This finding suggests that both male and female extension agents feel farmers show no gender-bias regarding when receiving their information. The successful transfer of information and implied knowledge is often dependent on successful face-to-face interaction (Keller, 2004), in this case between extension personnel and farmers.

Table 4. Preferred Formats Through Which Iraqi Farmers Prefer to Receive Agricultural Information, as Assessed by Iraqi Extension Personnel, and Formats Through Which the Extension Agents Prefer to Disseminate Information.

Format	Farmer preference (%)	Extension agent preference (%)
Personal face-to-face	64.2	74.9
Written brochures and bulletins	20.7	11.7
Internet	9.5	3.8
Video media	3.8	9.6
Written books	1.8	0.0

Opinions regarding the means by which farmers typically acquire agricultural training differed by gender among the attendees. The majority of trainees in both sessions (57.3%) responded that most farmers receive training from other local farmers and family members. Most Iraqi farmers possess no college education or specialized agricultural training. Approximately 46% of the mixed-gender session indicated that farmers had no formal agricultural education. However, this was the least common answer listed during the women's session (3.9%). As the regional representation of trainees was similar for both sessions, this difference is more likely perception than fact. One explanation may be that women agents are approached less by uneducated farmers and proportionately more by educated farmers. This interaction could lead to a perception by the women that most farmers are educated. Another possibility is that women extension agents may be more likely to consider training by family members, mentors, and extension workshops as legitimate sources of farmer education. Conversely, male extension agents may consider farmers as uneducated if their training was not from official sources. Nevertheless, Holz-Clause, Swaroop & Koundinya (2012) identified farmer-to-farmer communication as key to farmer learning globally in both developed and developing nations. Iraqi extension agents can capitalize on such interactions by teaming with respected farmers to conduct demonstrations, etc. to broaden farmer education.

Iraqi Women in Agriculture and Agricultural Extension

The gender of extension personnel and their audiences is an important consideration in agricultural extension systems worldwide**.** Female roles in Arab agriculture are seldom addressed, and facts often contradict stated ideals. For example, according to the Arab Charter on Human Rights, there should be no discrimination between men and women who are equal in terms of occupation. However, in most Arab countries women own less farmland and their average plot sizes are smaller than men's. Specifically, women own 28.6% of land in Jordan, 4.9% in the United Arab Emirates, and 0.4% in Oman (Cotula, 2007). In addition, men dominate agriculture extension positions in most Arab countries due to long-standing cultural norms (Cotula, 2007). For example, Arab women often need their husbands' approval for employment in the region. A substantial public investment is needed to strengthen women's advocacy and decision-making for improving overall agricultural diversity and management (Padmanabhan, 2008). Moreover, it has been recognized that women are critical agents in poverty reduction, food security, and environmental sustainability in rural areas (UN, 2011). The foundation to expand the role of women in Iraqi agricultural extension exists, based on the interactions that occurred over the course of the IAER program. This was particularly evident during the Dohuk KRG session, where the women were among the most attentive, apt, and energetic of the trainees. The women-only session held in Jordan was designed in part to improve the social capital of female Iraqi extension agents. This was seen as key, because women play an important role in information exchange in agricultural extension systems (Katungi, Edmeades & Smale, 2008).

The survey question concerning the role of women in agriculture enterprises led to uncertainty, discussion, and considerable debate, particularly in the mixed-gender session. Most participants in both sessions responded that women often contribute as

farm labor, but few manage the farm (see Table 5). Only one participant in each session believed women were not highly involved in agriculture in their governorate. Four participants at the mixed-gender session (14%) and five (19%) in the women's session responded that women manage more than 10% of farms in their areas. Women trainees stated during interviews that relatively few women own land. Women landowners generally obtain ownership through inheritance and have family members help manage the farm. However, the trainees indicated that Iraqi women are significantly involved in farming. Still, the wide range of responses in both sessions suggests that women's roles in managing farms are poorly understood or quantified. Gender-specific extension activities have been recommended for women farmers in Jordan to enhance their roles in agricultural production (Al-Rimawi, 2002). Implementing similar programs for Iraqi women farmers would likely improve their position in contributing to agricultural sustainability.

Table 5. Perceptions of Iraqi Extension Agents on the Involvement of Women in Iraq Agriculture (mixed-gender Syria Session (SS), n=29; women's only Jordan Session (JS), n=26)

Category of women involvement in agriculture	Number of responses in SS	Number of responses in JS
Women are not highly involved with agriculture in my region	1	1
Women are involved with raising food for the family but not for sale	5	5
Women are involved with farm work but rarely manage farm	13	13
Women manage some farms in my region, but less than 10%	6	2
Women manage 10 to 25% of farms	1	3
Women manage 25 to 50% of farms	2	0
Women manage over 50% of farms in my region	1	2

Conclusions, Recommendations, and Implications

The achievement of agricultural sustainability throughout the diverse regions of Iraq will largely depend on the success of extension agents in assisting farmers gain access to more relevant information and further appropriate technology. Results from this case study suggest that agricultural information was generally more available in 2008 than in 1998. However, further education of Iraq extension personnel is needed and can be achieved using specialists from more developed countries (Sawada, Matsuda & Kimura, 2007). Future training programs should include a review of general extension methods in addition to other identified topics. Such programs should evaluate the level of background that the trainees have on specific topics, as it may be necessary to begin instruction at a basic level. Future training should also understand that communication methods between extension agents and farmers in Iraq are largely based on face-to-face conversations. Thus, extensive discussion on new communication technologies would not be relevant in many regions. An approach targeting women extension personnel and farmers may address the specific needs of women by using them to transmit and horizontally exchange local knowledge (Hassanein, 1997; Trauger et al., 2008).

It is clear from the survey and interview results presented here, as well as reports from international aid organizations, that Iraq continues to lack adequate access to agricultural inputs, information and technologies. Specific needs are region-dependent and reflect differing recent

histories and turmoil. In order to meet the needs identified in this study, we suggest that future efforts should focus on increasing access to agriculture inputs, information and technology, enhancing communication among the diverse agricultural regions within Iraq. Also, increased efforts are needed that encourage expanding the role of women in Iraqi agriculture.

Acknowledgment
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Competencies and Experiences Needed by Entry Level International Agricultural Development Practitioners

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Abstract

The use of competencies within extension can be an effective way of training and developing extension practitioners (Stone, 1997). In preparation for careers in tomorrow's agricultural sector, the National Research Council (2009) recognized the need to expose college students to international perspectives. The purpose of this study was to determine the competencies and experiences that entry level agricultural development practitioners need in order to successfully work in an international setting. A modified Delphi method was used to achieve this purpose. A panel of experts in international agricultural development from non–government organizations, government organizations, and academic institutions were selected through snowball sampling (Goodman, 1961). The panelists agreed on 26 competencies and 7 experiences that entry level agricultural development practitioners working internationally should have before entering the profession. The results of this study should be used when planning, designing, and implementing agricultural extension education programs at the university level.

Keywords: Competencies, International Agricultural Development, Modified Delphi Method, Extension Education

Introduction

Competency-based management systems have been shown to act as frameworks to provide structure for employees to increase their skills as well as meet organizational goals (Martone, 2003). Lindner, Dooley, and Wingenbach (2003) defined competencies as the collective "knowledge, skills, and abilities" (p. 53) of the individual. Stone (1997) posited that competencies are an effective means of training and developing extension practitioners. The National Research Council (2009) recognized the need to expose undergraduate agriculture students to international perspectives in preparation for their future agricultural careers. Shinn, Wingenbach, Briers, Lindner, and Baker (2009) indicated the importance of international agricultural and extension education in the university curriculum to produce graduates who will effectively meet the needs of their stakeholders.

To be successful in the field of agricultural extension, the college graduate must rely on the knowledge and skills that he or she has acquired throughout an educational program (Lindner & Dooley, 2002) as well as life experiences (Lindner et al., 2003). Shinn et al. (2009) identified 12 knowledge domains that were deemed important when educating doctoral level agricultural extension professionals. The domains included:

(a) agricultural/rural development; (b) agricultural/biophysical systems; (c) change and technology adoption; (d) delivery strategies; (e) human resource development; (f) instructional design/curriculum development; (g) learning theory; (h) organizational development; (i) philosophy, history, and policy; (j) planning, needs assessment, and evaluation; (k) research methods and tools; and (l) scholarship and communications (p. 67).

The knowledge domains identified by Shinn et al. (2009) concur with and expand on the knowledge domains identified in other research. However, the knowledge domains identified were for doctoral level agricultural extension professionals and may not be as applicable to entry level agricultural development practitioners working internationally. Harder, Place, and Scheer (2010) identified 19 competencies that U.S. Cooperative Extension professionals will need by the year 2015. The competencies were grouped into two major groups that included: (a) extension program development and (b) core interpersonal skills (Harder et al., 2010). However, competencies identified by Harder et al. focused on extension professionals in the United States. A more complete picture of the competencies needed by international entry level agricultural development professionals is still not available. This study will add more to our understanding.

Theoretical Framework

Human capital theory was used due to its assertion that as people gain knowledge and skill through education, their capacity to successfully help society increases (Sweetland, 1996). Sweetland posited that both "individuals and society derive economic benefits from investments in people" (p. 351). Therefore, human capital theory recognizes various types of education via which it can be applied (Sweetland, 1996). The education categories include formalized education (Cohn & Geske, 1990), informal education (Schultz, 1981), on-the-job training (Mincer, 1974), and vocational education (Corazzini, 1967).

This theory recognized the importance of education and training in contributing to the good of society, including the sector of international agricultural development.

In addition, this study took into consideration McClelland's (1973) recommendation for a shift from intelligence tests and a "move toward criterion sampling based on job analysis" (p. 9). Criterion sampling would allow for individual competencies to be measured and would also measure improvement or advancement within a particular competency (McClelland, 1973). In an effort to ensure that the criterion sampling did not become too specific for one job, McClelland suggested four general categories that may be used to organize competencies: (a) Communication skills, (b) Patience, (c) Moderate goal setting, and (d) Ego development.

Purpose and Objectives

The purpose of this study was to determine what entry-level agricultural development practitioners needed to successfully work in international settings. The specific objectives were to:

1. Identify global *competencies* that entry-level international agricultural development practitioners should obtain before entering the profession.
2. Identify global *experiences* that entry-level international agricultural development practitioners should have before entering the profession.

Methods

This study used a modified Delphi method due to its acceptance and ability to identify a consensus from a panel of experts (Dalkey, 2002; Dalkey, 1969; Helmer, 1966; Stufflebeam, McCormick, Binkerhoff, & Nelson, 1985). The Institutional Review Board from the University of Florida approved the methods used for this study. The critera for membership on the panel were twofold: (a) the panelist must have been currently involved in international agricultural extension through a nongovernmental organization, government organization, or an academic institution and (b) the panelist must have had experience working with entry-level agricultural extension practitioners in an international context. Initially, 17 panelists were purposively selected in order to ensure that potential panelists met the criteria for panel membership and were deemed experts in the field. In addition, the snowball sampling method (Goodman, 1961) was used to identify five additional panelists in order to meet Dalkey's (2002) recommendation of having 13 panelists to ensure a reliability coefficient of 0.9. A total of 22 agricultural extension professionals were identified and invited to participate in the study through the use of electronic mail. A total of 13 experts representing nongovernmental organizations, government organizations, and academic institutions from around the world agreed to participate. Panelists resided in Asia, Central America, Europe, North America, and South America, but also represented considerable experience and prolonged engagement (including former residency) with extension in Africa. Panelists represented several different nationalities, although nearly half were from the United States. The panel was split nearly evenly between male and female participants ranging widely in age.

The online survey tool, Qualtrics, was used to collect three rounds of data for this study. Electronic notifications were sent to each panelist and included a link to the questionnaire. The timing of the pre-notice, notice, and follow-up electronic mailings were constructed based on Dillman, Smyth, and Christian's (2009) recommendations.

Round 1

Round 1 of the study consisted of one open-ended question: "What competencies and experiences would college students need before they graduate to prepare them to work in the field as an entry-level international agricultural development practitioner?" Pre-notice, notice, and follow-up electronic mailings were sent to each participant to encourage participation (Dillman et al., 2009). The responses to the introductory question were analyzed and categorized using the constant–comparative method (Glaser & Straus, 1967). Responses that were deemed to have the same meaning as responses provided by other panelists were combined into one response. The response statements were then dichotomized into competencies and experiences. Twelve of thirteen panelists responded (92%) and suggested 42 competencies and 18 experiences.

Round 2

Round 2 was composed of a 60-statement instrument based on the competencies and experiences identified in Round 1. A five-point rating scale was used to allow the participants to rank their level of agreement or disagreement. The ratings include: 1 – *strongly disagree*, 2 – *disagree*, 3 – *neither disagree nor agree,* 4 – *agree,* and 5 – *strongly agree* for each competency and experience. The participants were also given the opportunity to reword any of the competencies and experiences or suggest additional competencies and experiences. Pre-notice, notice, and follow-up electronic mailings were sent to panelists to encourage their participation (Dillman, et al., 2009). Thirteen panelists (100%) responded to both the competencies and experiences sections of the questionnaire. After completion of Round 2, the competencies and experiences were analyzed to determine which competencies and experiences would be included in Round 3. It was determined *a priori* that the competencies and experiences rated by two-thirds of the panelists as *agree* or *strongly agree* would advance to Round 3. If the panelists did not achieve a two-thirds consensus, the competency or experience did not advance to the next round. A two-thirds consensus has been used in past research in the agricultural education field (Harder et al., 2010; Martin, Fritzsche, & Ball, 2006; Shinn et al., 2009). The panelists agreed on 32 competencies and 10 experiences. One additional competency and two additional experiences were added to *Round 3* based on panelist recommendations from *Round 2*. Additionally, fifteen competencies were reworded based on the recommendations from the panelists.

Round 3

Round 3 comprised 32 competencies and 10 experiences. Panelists were given a dichotomous scale and instructed to indicate the level at which they *disagreed* or *agreed* with each. In Round 3, panelists were also presented with any rewordings or additional competencies or experiences that were suggested during Round 2. In addition, panelists were presented with the descriptive statistics from Round 2. In order to adhere to stringent consensus rate, the researchers deviated from the two-thirds consensus rate used in previous research (Harder et al., 2010; Martin, Fritzsche, & Ball, 2006; Shinn et al., 2009). It was determined *a priori* that an 80% agreement rate would determine that the competency or experience would be retained and identified as a needed competency or experience for entry-level international agricultural development practitioners. Again, participants received pre-notice, notice, and follow-up electronic mailings to encourage participation (Dillman

et al., 2009). Twelve out of thirteen participants (92%) responded to Round 3.

Results

Round 1 and Round 2

An open-ended question was used to construct a list of competencies and a list of experiences needed by entry-level agricultural development practitioners who aspire to work internationally. The open-ended question consisted of, "What competencies and experiences would college students need before they graduate to prepare them to work in the field as an entry-level international agricultural development practitioner?" From the open-ended question, panelists provided 42 potential competencies and 18 potential experiences in Round 1. The panelists' competencies are presented in Table 1 and the experiences are listed in Table 2. In addition, the competencies and experience findings from Round 2 were included in Table 1 and Table 2, respectively.

During Round 2, the panelists were given the opportunity to review and rate the level to which they disagreed or agreed with each one of the 42 competencies (see Table 1) and 18 experiences (see Table 2) identified in Round 1. Round 2 resulted in 11 competencies being dropped due to achieving less than two-thirds agreement and 31 competencies were retained for Round 3. The competencies excluded from Round 3 were: (a) Speak a foreign language, (b) Discuss the principles of change theory and processes, (c) Discuss the principles of delivery strategies, (d) Discuss history, (e) Discuss contextual applications, (f) Discuss the principles of ethics, (g) Discuss the principles of learning theory, (h) Discuss the importance of networking skills, (i*)* Discuss the principles of curriculum development, (j) Discuss the principles of instructional design, and (k) Discuss the principles of philosophy. Fifteen competencies were reworded after the completion of Round 2 and one additional competency was added for Round 3: *Discuss how socio-political issues affect agricultural development.* Therefore, 31 competencies were presented to the panelists in Round 3.

In addition, 10 experiences were dropped after Round 2*:* (a) Successfully complete at least a 3 month internship, (b) Interact with people of different cultures within the United States, (c) Work with people involved in financial budgeting, (d) Complete a participatory rural appraisal training, (e) Practice data recording, (f) Participate in a research organization, (g) Complete a study abroad experience, (h) Complete a gender training session, (i) Work with people involved in conflict resolution, and (j) Work with people involved in economic decision making. Two additional experiences were added after Round 2: *Work with people involved in an evaluation project* and *Work with people involved in managing a project.* Therefore, 10 experiences were presented to the panelists in Round 3.

Table 1. Percent of Consensus of Proposed Competencies: Delphi Round 1 and Round 2

Competencies Identified in Round 1 and Round 2	Round 2 (*N* = 13) Agree or Strongly Agree %
1. Exhibit an interest in working with people	100.00[a]
2. Describe cultural sensitivity in regards to international agricultural development	100.00[a]
3. Describe how natural resource management affects international agricultural development	92.31[a]
4. Describe how the agricultural sciences (crops, livestock, environmental science, and economics) affect international agricultural development	92.31[a]
5. Describe commonly used research methods	92.31[a]
6. Discuss socio-cultural-political issues within international agricultural development	92.31[a]
7. Discuss program planning techniques	92.31[a]
8. Work well with others	92.31[a]
9. Discuss diverse cultural contexts with international agricultural development	92.31 [a]
10. Discuss community development	92.31
11. Demonstrate communication skills	92.31
12. Exhibit good listening skills	92.31
13. Exhibit flexibility	92.31
14. Discuss the principles of a needs assessment	92.31
15. Describe how agribusiness management affects international agricultural development	84.62[a]
16. Describe agricultural development issues locally	84.62[a]
17. Describe agricultural development issues globally	84.62[a]

18. Identify their technical area of expertise	84.62[a]
19. Embrace diversity	84.62[a]
20. Explain local farming systems used in the area in which they are working	84.62
21. Exhibit organizational skills	84.62
22. Exhibit patience when working with people	84.62
23. Exhibit the ability to synthesize material quickly	84.62
24. Discuss the principles of rural development	84.62
25. Describe agricultural development issues regionally	76.92[a]
26. Demonstrate writing skills	76.92
27. Discuss community cultures	76.92
28. Create presentations	69.23
29. Discuss the principles of organizational development	69.23
30. Discuss the principles of program planning	69.23
31. Exhibit critical thinking skills	69.23
32. Speak a foreign language	61.54
33. Discuss the principles of change theory and processes	61.54
34. Discuss the principles of delivery strategies	61.54
35. Discuss history	61.54
36. Discuss contextual applications	61.54
37. Discuss the principles of ethics	53.85
38. Discuss the principles of learning theory	46.15
39. Discuss the importance of networking skills	38.46
40. Discuss the principles of curriculum development	30.78
41. Discuss the principles of instructional design	23.01
42. Discuss the principles of philosophy	23.01

[a] The statement was reworded after Round 2.

Table 2. Percent of Consensus of Proposed Experiences by: Delphi Round 1 and Round 2

Experiences Identified in Round 1 Round 2	Round 2 (*N* = 13) Agree or Strongly Agree %
1. Successfully work within a different cultural setting	84.62
2. Complete a development course	84.62
3. Interact with people of different cultures outside the United States	84.62
4. Work with people involved in designing a project	84.62
5. Successfully live within a different cultural setting	76.92
6. Successfully complete an agriculturally based work experience	76.92
7. Successfully complete a field experience in a developing country	76.92
8. Successfully complete a field experience with an agricultural development practitioner	69.23[a]
9. Successfully complete at least a 3 month internship	61.54
10. Interact with people of different cultures within the United States	61.54[a]
11. Work with people involved in financial budgeting	61.54
12. Complete a participatory rural appraisal training	53.85
13. Practice data recording	53.85
14. Participate in a research organization	50.00
15. Complete a study abroad experience	46.15
16. Complete a gender sensitivity training session	46.15
17. Work with people involved in conflict resolution	38.46
18. Work with people involved in economic decision making	38.46

[a] The statement was reworded after Round 2.

Round 3

The panelists were given one final opportunity to agree or disagree with the competencies or experiences. It was determined *a priori* that an 80% agreement rate would determine that a competency or experience would be retained from Round 2. The competency results for Round 3 have been presented in Table 3, and the experiences are presented in Table 4. Round 3 began with 32 competences and resulted in five competencies failing to reach consensus of agreement amongst the panelist: (a) Explain local farming systems used in the area in which they are working, (b) Discuss the principles of organizational development, (c) Create presentations, (d) Discuss community cultures, and (e) Identify with a technical area. As a result, 27 competencies were retained from this study.

In Addition, Round 3 started with 10 experiences and resulted in three experiences: (a) Successfully complete an agriculturally based work experience, (b) Successfully complete a field experience with an agricultural development practitioner in either the United States or internationally, and (c) Work with people involved in designing a project. The reduction of experiences resulted in seven experiences.

Table 3. Percent of Consensus for Proposed and Retained Competencies: Delphi Round 3 (n =12)

Competencies	**Agree %**
1. Explain global agricultural development issues	100.00
2. Explain how natural resource management affects agricultural development	100.00
3. Discuss how socio-cultural issues affect agricultural development	100.00
4. Apply program planning techniques	100.00
5. Demonstrate communication skills	100.00
6. Work well with practitioners, researchers, and policy makers	100.00
7. Exhibit good listening skills	100.00
8. Exhibit flexibility	100.00
9. Discuss the principles of a needs assessment	100.00
10. Appreciate and understand cultural difference	100.00
11. Exhibit critical thinking skills	100.00
12. Explain how agribusiness affects agricultural development	91.66

13. Explain how knowledge of agricultural sciences affects agricultural development	91.66
14. Discuss how socio-political issues affect agricultural development	91.66[a]
15. Discuss culturally sensitive topics that they may encounter as they implement agricultural development projects	91.66
16. Exhibit patience when working with people	91.66
17. Exhibit the ability to synthesize material quickly	91.66
18. Explain local agricultural development issues	83.33
19. Explain regional agricultural development issues	83.33
20. Apply commonly used research methods	83.33
21. Discuss community development approaches and techniques in providing rural advisory services	83.33
22. Exhibit organizational skills	83.33
23. Demonstrate writing skills	83.33
24. Exhibit interest in other people	83.33
25. Discuss different cultural perspectives of agricultural development	83.33
26. Discuss the principles of rural development	83.33
27. Discuss the principles of program planning	83.33
28. Explain local farming systems used in the area in which they are working	75.00
29. Discuss the principles of organizational development	75.00
30. Create presentations	66.66
31. Discuss community cultures	66.66
32. Identify with a technical area	58.33

[a] New competency that was added after Round 2

Table 4. Percent of Consensus for Proposed and Retained Experiences: Delphi Round 3 (n =12)

Experiences	Agree %
1. Successfully work within a different cultural setting	91.66
2. Successfully complete a field experience in a developing country	91.66
3. Complete a development course	91.66
4. Have enjoyed living in a different cultural setting	83.33
5. Interact in person with people of different cultures outside the United States	83.33
6. Work with people involved in managing a project	83.33
7. Work with people involved in evaluating a project	83.33
8. Successfully complete an agriculturally based work experience	75.00
9. Successfully complete a field experience with an agricultural development practitioner in either the United States or internationally	75.00[a]
10. Work with people involved in designing a project	66.66[a]

[a] A new competency added after Round 2

Conclusions, Recommendations, and Implications

Professionals in the field of international agricultural development involved in nongovernmental organizations, government organizations, or academic institutions agreed on 27 competencies and seven experiences that are critical in preparing college students for entry-level positions in international agricultural development. The findings suggest that job preparedness for entry-level agricultural development practitioners consists of some combination of competency development and experiences prior to working internationally. Those individuals who are charged with preparing the next generation of entry-level international agricultural development practitioners should use this list to develop appropriate educational programs and experiences. As educators develop future international agricultural development practitioners, society will benefit through the knowledge and skill development that will take place through formal education at the tertiary level (Sweetland, 1996). The identified competencies and experiences should be used to objectively assess the students as to the extent to which the desired competencies and experiences have been either organized or occurred. Extension educators and future employers should then provide the student/employee with the appropriate

knowledge and skills to fully meet the goals of the desired competency. It is important to note that the competency and experience list should not be used as a set of criteria which the student must fully meet in order to begin their careers as international agricultural development practitioners. Instead the competencies and experiences should be used as guides by which extension educators and employers strive to provide students with the appropriate knowledge, skills, and experiences to successfully fulfill their job responsibilities and improve society.

The competencies and experiences retained from this study signify the type of knowledge, skills, and experiences that international agricultural development professionals deem important. The retained competencies and experiences reflect a need or value for a practitioner who is competent and up to date on agricultural development issues, capable of working in culturally diverse situations, capable of viewing the world from different cultural perspectives, able to work well with people, and an effective communicator. International agricultural development employers are looking for future practitioners who are well-rounded individuals competent within the field of agricultural development, capable of learning quickly, and able to effectively work on a team as well as with culturally diverse people.

The extensive list of competencies and experiences produced in this study reaffirms the call of Shinn et al. (2009) for universities to produce graduates who meet the needs of stakeholders. The findings of this study also fit into the knowledge domains developed for doctoral graduates in the field (Shinn et al., 2009). In accordance with Harder et al. (2009), the identified competencies and experiences should be integrated into university curriculum in order to provide students a research-based curriculum that will effectively prepare them to work as international agricultural development practitioners. In addition, findings align with McClelland's (1973) call to use competencies to evaluate and assess learners' advancement or improvement within a competency.

Interestingly, the panelists only came to a consensus on 32 of the 60 proposed competencies and experiences. The lack of consensus raises the question of whether or not some competencies and experiences are more valued than others. In accordance with Shinn et al. (2009), panelists may have failed to reach consensus due to the uniqueness of the proposed competency or experience, and may have agreed upon statements that are applicable to all international agricultural development situations. McClelland (1973) warned against developing competencies that are too specific to a particular job. However, panelists may have failed to reach consensus regarding competencies and experiences due to the breadth of international extension work that has been conducted. In addition, consensus may have been hampered by the pragmatic nature of people within the field of international agricultural development. The panelists may have viewed particular competencies and experiences as irrelevant or less useful when completing a particular type of international extension work, and therefore the panelists may have viewed some of the proposed competencies and experiences as less relevant.

Future research needs to be conducted to determine the extent to which the identified competencies and experiences are being addressed in current training programs in professional agricultural development. After the universities and colleges identify which competencies and experiences are currently being organized through their curriculum, research should be done to identify how the programs implement the competencies and

experiences into students' programs of study. This would serve as a best practices guide and aid agricultural extension programs in producing entry-level agricultural development practitioners based on the prescribed competencies and experiences. Implementing the identified competencies and experiences into comprehensive agricultural education and extension programs will help to build the capacity of agricultural development organizations and allow them to better serve their clientele (Liles, 2004). Additionally, future research should be conducted to determine whether the needs of international agricultural development practitioners vary depending on the region in which international development is being conducted.

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An Assessment of Extension Officers' Self-Perceived Programming Competencies in Selected Caribbean Countries

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Abstract

Developing the human capacity of extension systems is a necessary part of improving services intended to meet the needs of small farmers. The purpose of this study was to determine the competencies for which professional development is needed in the area of programming for extension officers in selected Caribbean countries. A survey was conducted with all extension officers attending in-service trainings in Belize, Grenada, and Saint Lucia, using the Borich method to identify priority training needs. The greatest needs were most frequently observed in the areas of program planning and evaluation, although considerable variation existed across the group. The resulting challenge is to develop professional development resources that can be individualized by country while remaining cost-effective and accessible.

Introduction & Theoretical Framework

A strong extension system staffed by skilled personnel can play a valuable role in improving rural livelihoods (Swanson & Rajalahti, 2010). Extensionists must possess and be able to use a diverse set of competencies to maintain the strength of extension as an educational leader (Liles, 2004; Moore & Rudd, 2004; Stone & Coppernoll, 2004). As extension has evolved, so have the competencies required of extension personnel at all levels (Cooper & Graham, 2001; Maddy, Niemann, Lindquist, & Bateman, 2002). Understanding competencies in extension is valuable for improving the proficiency of existing personnel (Harder & Wingenbach, 2008; Liles, 2004; Maddy et al., 2002).

Professional competency is broadly defined as the skills and knowledge that allows for the successful performance of specific tasks (Liles, 2004; Silvera, 1999). Stone and Bieber (1997) defined competency as "the application of knowledge, technical skills and personal characteristics leading to outstanding performance" (p. 1). McClellan (1973) is credited with the competency approach, which centers on the belief that individual performance is better assessed through the demonstration of skills and abilities than through measures of intelligence (Athey & Orth, 1999). Buford et al. (1995) noted that competencies establish the qualifications needed by extension personnel to carry out specific duties and responsibilities. Competency behaviors that develop over time and can be linked to "meaningful life outcomes" (Athey & Orth, 1999, p. 216) are more useful for an organization's success. Although competencies can often overlap (Moore & Rudd, 2004), organizations that identify the core competencies required of their personnel can tailor professional development training specifically to areas that would "lead to excellence in the workplace" (Liles, 2004, p. 77).

In agricultural extension, core competencies are applied both to preparing entry-level professionals (Harder, Place, & Scheer, 2010; Lindner, Dooley, & Wingenbach, 2003) and to the professional development of existing agents (Ghimire & Martin, 2011; Shim, 2006). Extension research often differs on specific competencies, but the core groups of program planning, teaching, and evaluation are largely consistent across contexts and cultures (Arguelles & Gonczi, 2001; Ghimire & Martin, 2011; Scheer, Cochran, Harder, & Place, 2011). Planning competencies help maximize program effectiveness. Specific foci include understanding stakeholders and context (Cochran, 2009; Maddy et al., 2002), adapting to changing needs and social realities (Arguelles & Gonczi, 2001; Brinkman, Westendorp, Wals, & Mulder (2007), and effective utilization of extension funds (LaMuth & Jackson, 2003) and personnel (Cochran, 2009; Liles, 2004). Competencies and competency models in teaching and program implementation commonly focus on subject knowledge and teaching methods (e.g., Brinkman et al., 2007; Karbasioun, Mulder, & Biemans, 2007; Maddy et al., 2002; Scheer et al., 2011; Shim, 2006), while others (Harder et al., 2010; Lindner et al., 2003) include interpersonal and communication skills competencies. Finally, evaluation competencies are heavily emphasized for determining program impact and areas of improvement in both domestic (North Carolina State University Extension, n.d.; Strong & Harder, 2011b) and international (Pezeshki-Raad, Yoder, & Diamond, 1994) contexts.

Purpose and Objectives

The purpose of this study was to determine the competencies for which professional development is needed in the area of programming for extension officers in selected Caribbean countries. Specific objectives were: to describe officers' perceived levels of proficiency for programming competencies, to describe the perceived level of importance assigned by officers to programming competencies, and to compare proficiency and importance levels for each competency to determine priority training needs.

Methods

The study was conducted with extension officers (N = 163) attending in-service trainings in three countries in the Caribbean region in 2011. The trainings were arranged by the Food and Agriculture Organization of the United Nations as a part of their assistance to regional governments in capacity building. The major topics were extension program development and contemporary communication and delivery methods. Data was collected prior to the commencement of training in each country.

The survey instrument used to collect data was derived from the Essential Competencies for Program Evaluators model (Ghere, King, Stevahn, & Minnema, 2006), Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001), and researcher-developed statements. The instrument included four sections: (a) program planning, (b) interacting with learners, (c) teaching tools and methods, and (d) program evaluation areas.

A Borich (1980) model of needs assessment was used to measure participants' perceptions of 38 programming competency statements. With a Borich model, participants rate each competency statement on their own personal proficiency and their perceptions of how important a competency is for their work. Participants in this study used two four-point scales to rate proficiency and importance: 1 = *No Proficiency/Importance*, 2 = *Low Proficiency/Importance*, 3 = *Average Proficiency/Importance*, and 4 = *High Proficiency/Importance*. The scales were interpreted as follows: *No Proficiency/Importance* = 1.00–1.50, *Low Proficiency/Importance* = 1.51–2.49, *Average Proficiency/Importance* = 2.50–3.49, and *High Proficiency/Importance* = 3.50–4.00. The study is limited by the use of self-reported levels of proficiency.

Items from the Essential Competencies model (Ghere et al., 2006) and the Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001) were demonstrated to be valid and reliable when used to survey extension volunteers and professionals (Lamm & Israel, 2011; Strong & Harder, 2011a). The instruments were reviewed by Caribbean extension professionals to determine their internal validity for officers in the participating countries. An *ex post facto* analysis of the four constructs using Cronbach's alpha within the survey instrument yielded reliability coefficients ranging from.78 (Interacting with Learners – Perceived Importance) to .96 (Program Planning – Perceived Importance).

Data were collected in person by one of the researchers at a mandatory in-service training held in each country. Fifty-five (n = 55) extension officers were surveyed in Grenada, thirty-five officers (n = 35) in Belize, and twenty-nine officers (n = 29) in Saint Lucia.

Descriptive statistics were used to address the first two objectives by country and the overall group. The ranking procedure described by Edwards and Briers (1999) was used to address the third objective by country and overall group. Data were analyzed according to procedures

established by Borich (1980). A discrepancy score was obtained for each participant by subtracting his/her perceived level of proficiency from the perceived level of importance reported for a specific programming competency. Each discrepancy score was then multiplied by the mean importance level for that competency, resulting in a weighted discrepancy score for each participant. The weighted discrepancy scores were summed and divided by the total number of usable observations to yield a mean weighted discrepancy score for the competency. The mean weighted discrepancy scores for all the competencies were ranked to determine the priorities for addressing the programming needs of respondents.

Findings/Results

The first objective was to describe the respondents' self-perceived levels of proficiency for each competency, according to country and overall group. Due to space limitations, only the competencies with the five highest means for each country and the overall group have been presented in Table 1. The competencies with the five lowest means for each country and the overall group are presented in Table 2. Interested readers may contact the authors for complete results.

Diversity across the group resulted in ten competencies being identified as those for which extension officers perceived themselves to be most proficient. The only competency for which all extension officers, regardless of country, considered themselves to be highly proficient was *Conducting individual farm visits*. Extension officers in at least two countries had similarly positive perceptions of their proficiency for three other competencies: *Conducting field days*, *Providing an alternative explanation or example when clientele are confused*, and *Identifying target (groups) audiences for my programs*. Extension officers in Saint Lucia tended to have higher levels of self-perceived proficiency than their counterparts in Grenada and Belize.

Table 1. Highest Self-Perceived Levels of Proficiency by Country and Overall Group

Competency	Belize	Grenada	Saint Lucia	Group
	M *SD*	*M* *SD*	*M* *SD*	*M* *SD*
Conducting individual farm visits	3.50 .61	3.73 .64	3.77 .43	3.67 .59
Conducting field days	3.42 .65	--	3.70 .47	3.36 .80
Teaching with PowerPoint presentations	3.36 .59	--	--	--
Conducting workshops	3.31 .75	--	--	--
Providing an alternative explanation or example when clientele are confused	3.31 .67	3.37 .66	--	3.37 .64

Motivating clients to participate in programs	--	3.38 .88	--	3.39 .82
Developing a program of work	--	3.31 .68	--	--
Identifying target (groups) audiences for my programs	--	3.28 .95	3.70 .47	3.38 .81
Conducting result demonstrations	--	--	3.70 .54	--
Adjusting lessons to the proper level for individual clientele	--	--	3.67 .48	--

Note. *No Proficiency* = 1, *Low Proficiency* = 2, *Average Proficiency* = 3, *High Proficiency* = 4.

Eleven competencies were identified as those which officers in one or more of the surveyed countries felt they had the lowest proficiency. Universally, *Conducting Nominal Group techniques to identify community needs* was identified as a competency for which officers felt they had average proficiency. Extension officers in at least two countries had similar perceptions of their proficiency for three other competencies: (a) *Using quantitative evaluation methods (e.g., number-based surveys, tests, reports) to measure the effectiveness of my programs*, (b) *Conducting key stakeholder discussions to identify community needs*, and (c) *Involving stakeholders in program planning.* Officers in Grenada were the only respondents who perceived they had low proficiency for any of the competencies; they indicated *Teaching with slides* (*M* = 2.41, *SD* = 1.06) was a competency for which they had low proficiency.

Table 2. Lowest Self-Perceived Levels of Proficiency by Country and Overall Group

Competency	Belize	Grenada	Saint Lucia	Group
	M *SD*	*M* *SD*	*M* *SD*	*M* *SD*
Using quantitative evaluation methods (e.g. number-based surveys, tests, reports) to measure the effectiveness of my programs.	2.67 .79	2.67 .89	--	2.82 .84
Conducting Nominal Group techniques to identify community needs.	2.68 .84	2.74 .92	2.97 .89	2.78 .89
Conducting key stakeholder discussions to identify community needs	2.75 .73	--	3.07 .74	--
Using ranking procedures for prioritizing issues identified during a needs assessment	2.75 .84	--	--	--

Involving stakeholders in program planning	2.75 .69	--	3.13 .73	--
Teaching with slides	--	2.41 1.06	--	2.83 .99
Teaching with PowerPoint presentations	--	2.61 1.06	--	--
Promoting linkages between producers and processors	--	2.73 .95	--	--
Using rating procedures for prioritizing issues identified during a needs assessment	--	--	3.13 .78	2.87 .85
Conducting focus groups to identify community needs	--	--	3.17 .75	--
Using qualitative evaluation methods (e.g. interviews, focus groups, observations) to measure the effectiveness of my programs	--	--	--	2.88 .85

Note. *No Proficiency* = 1, *Low Proficiency* = 2, *Average Proficiency* = 3, *High Proficiency* = 4.

The second objective was to describe the perceived level of importance assigned by officers to programming competencies by country and the overall group. As with the first objective, only the competencies with the five highest means for each country and the overall group have been presented in Table 3. The competencies with the five lowest means for each country and the overall group are presented in Table 4.

Nine competencies were identified by officers as the most important for their jobs. *Conducting individual farm visits* was identified as a competency of high importance by officers in all three countries, and it was the highest rated competency for the group overall (M = 3.78, SD = .49). Extension officers in at least two countries had similarly high perceptions of the importance of four other competencies: (a) *Conducting field days*, (b) *Motivating clients to participate in programs*, (c) *Developing a program of work*, and (d) *Conducting result demonstrations*. Less variation in perceptions within and between countries was observed in the officers' ratings of the most important competencies as compared to their self-perceptions of proficiency.

Table 3. Highest Perceived Levels of Importance by Country and Overall Group

Competency	Belize	Grenada	Saint Lucia	Group
	M *SD*	*M* *SD*	*M* *SD*	*M* *SD*
Conducting field days	3.86 .36	3.56 .85	--	3.70 .65
Motivating clients to participate in programs	3.75 .44	--	3.80 .41	--
Developing a program of work	3.75 .60	3.69 .61	--	3.68 .61
Conducting result demonstrations	3.74 .56	--	3.87 .35	--
Conducting individual farm visits	3.74 .56	3.78 .50	3.83 .38	3.78 .49
Providing an alternative explanation or example when clientele are confused	--	3.80 .41	--	3.70 .50
Responding well to difficult questions from clientele	--	3.67 .59	--	3.66 .58
Developing a Calendar of activities to guide my Annual Program of Work	--	--	3.80 .48	--
Adjusting lessons to the proper level for individual clientele	--	--	3.80 .41	--

Note. *No Importance* = 1, *Low Importance* = 2, *Average Importance* = 3, *High Importance* = 4.

There were nine competencies that were identified as the least important across the three countries and the overall group. No competency received a rating lower than average importance. However, *Conducting Nominal Group techniques to identify community needs* was identified as less important by officers in all three countries, and it was the lowest rated competency for the group overall ($M = 3.10$, $SD = .88$). Officers in all three countries also agreed that *Using rating procedures for prioritizing issues identified during a needs assessment* was one of the least important competencies. Extension officers in at least two countries shared similar perceptions of the importance of two other competencies: *Teaching with slides* and *Using ranking procedures for prioritizing issues identified during a needs assessment*. The variation in officers' perceptions of the least important competencies was greater than was observed for their perceptions of the most important competencies.

Table 4. Lowest Perceived Levels of Importance by Country and Overall Group

Competency	Belize	Grenada	Saint Lucia	Group
	M *SD*	*M* *SD*	*M* *SD*	*M* *SD*
Lecturing	3.03 .86	--	--	3.23 .87
Using rating procedures for prioritizing issues identified during a needs assessment	3.11 .71	3.06 92	3.27 .74	3.13 .81
Teaching with slides	3.11 .93	3.13 .95	--	3.20 .89
Conducting Nominal Group techniques to identify community needs	3.14 .76	3.06 .97	3.13 .86	3.10 .88
Using ranking procedures for prioritizing issues identified during a needs assessment	3.22 .64	3.10 .92	--	3.22 .80
Teaching with PowerPoint presentations	--	3.17 .90	--	--
Conducting key stakeholder discussions to identify community needs	--	--	3.27 .87	--
Using qualitative evaluation methods (e.g. interviews, focus groups, observations) to measure the effectiveness of my programs	--	--	3.30 .79	--
Conducting semi-structured interviews to identify community needs	--	--	3.37 .77	--

Note. *No Importance* = 1, *Low Importance* = 2, *Average Importance* = 3, *High Importance* = 4.

The third and final objective of the study was to compare proficiency and importance levels for each competency to determine priority training needs by country and the overall group. The five highest priority training needs for each country and the overall group as determined by mean weighted discrepancy scores are presented in Table 6. Identifying the five highest priority training needs by country and for the overall group resulted in 14 competencies being selected. Unlike in prior objectives, there was no single competency for which all three countries had a highest priority training need. While five competencies were shared as highest priorities for at least one country and the overall group, only one competency – *Using quantitative evaluation methods* – was a shared priority for two countries. There was no overlap between the highest priority training needs of Saint Lucia with either Belize or Grenada. Also, the MWDS for Saint Lucia were the lowest of the groups that responded while Belize had the highest MWDS.

Table 5. Highest Priority Training Needs by Country and Overall Group

Competency	Belize	Grenada	Saint Lucia	Group
	MWDS	MWDS	MWDS	MWDS
Involving stakeholders in program planning	3.29	--	--	--
Developing a program of work	3.10	--	--	--
Using quantitative evaluation methods (e.g. number-based surveys, tests, reports) to measure the effectiveness of my programs	3.02	2.51	--	2.10
Conducting result demonstrations	2.97	--	--	1.97
Developing recommendations for future programming based the findings of my evaluation	2.81	--	--	1.84
Teaching with slides	--	2.46	--	--
Using qualitative evaluation methods (e.g. interviews, focus groups, observations) to measure the effectiveness of my programs	--	2.33	--	--
Identifying necessary resources (e.g., money, time, materials) for my programs	--	2.25	--	--
Establishing and managing demonstration plots	--	2.22	--	1.89
Promoting linkages between producers and processors	--	--	1.53	2.10
Clearly stating the intended program outcomes of programs	--	--	1.52	--
Developing a Calendar of activities to guide my Annual Program of Work	--	--	1.47	--
Providing an alternative explanation or example when clientele are confused	--	--	1.38	--
Determining what content is needed to achieve intended program outcomes	--	--	1.16	--

Diversity among respondents existed when identifying the lowest priority training needs. Fourteen competencies were identified when examining the five lowest priority training needs by country and for the overall group. Three of the lowest priority training needs for the overall group were shared as lowest priorities by at least one country, while two were unique to the group alone. Belize and Grenada had similarly low MWDS for *Identifying target (groups) audiences for my programs*. Grenada and Saint Lucia also shared a low need for training on *Conducting individual*

farm visits. *Teaching with slides* was a low priority for training for Belize and Saint Lucia. Only one negative MWDS was observed for the Belizean officers whose responses strongly indicated that there was no need for training on *Teaching with PowerPoint presentations*.

Table 6. Lowest Priority Training Needs by Country and Overall Group

Competency	Belize	Grenada	Saint Lucia	Group
	MWDS	MWDS	MWDS	MWDS
Teaching with PowerPoint presentations	-.19	--	--	--
Teaching with slides	.29	--	.22	--
Lecturing	.29	--	--	--
Identifying target (groups) audiences for my programs	.72	.84	--	.66
Providing an alternative explanation or example when clientele are confused	.73		--	--
Conducting individual farm visits	--	.38	.26	.53
Motivating clients to participate in programs	--	.46	--	--
Using rating procedures for prioritizing issues identified during a needs assessment	--	.79	--	.76
Conducting key stakeholder discussions to identify community needs	--	.97	--	--
Conducting on-farm trials	--	--	.12	--
Using the results of a needs assessment to plan my programs	--	--	.25	--
Conducting field days	--	--	.25	--
Using ranking procedures for prioritizing issues identified during a needs assessment	--	--	--	.97
Conducting semi-structured interviews to identify community needs	--	--	--	.97

Conclusions/Implications/ Recommendations

Several key areas of extension program development need immediate attention if a quality education service is to be provided. Planning and evaluation methods are the competency areas for which professional development is most urgently needed, as demonstrated by the frequency with which specific competencies within those areas were included in the list of priority training needs. The results suggest that extension officers in the surveyed countries felt very confident in their teaching abilities but were less prepared to design and evaluate extension programs. The lack of planning and evaluation competencies limits the ability of extension to conduct focused programming that leads to measurable educational outcomes, a key factor in demonstrating accountability to stakeholders and funding agencies.

The lowest self-perceived levels of proficiency were in alternative needs assessment methods, qualitative evaluation methods, and participatory methods (nominal group and ranking techniques). Similar areas were identified as lowest importance in program development. This tends to suggest that staff may not know the value of these methods and their usefulness in program development. As such, it highlights the need to expose staff to a variety of needs assessment methods and their usefulness. Individual farm visits by staff to farmers' holdings is the main method of dealing with problems, identifying needs, and transferring technology to farmers in the surveyed countries. This teaching methodology is confirmed as the area of highest proficiency by staff across the three countries, and it is closely associated with the other highly proficient area of *providing an alternative explanation or example when clientele are confused*. Further, all staff confirmed this as the highest area of importance for them as they plan and deliver programs. While meeting with farmers and assessing their needs is most effective, it is highly inefficient. Given the high number of farmers and the small staff sizes in each country, limited service is provided. Knowledge and skills to use alternative needs assessment and delivery methods must be acquired by staff.

The extent of variation in highest priority training needs determined by the study points to the present need to consider the development of modular training tailored to the needs of each country. Belizean extension officers could benefit from training that focuses on participatory programming methods, constructing programs of work, doing quantitative needs assessment, and facilitating demonstrations. Training for extension officers in Grenada should focus on improved qualitative needs assessment methods, strategies to access improved funding, use of modern teaching and learning aids, and managing demonstration plots. St. Lucia extension officers could build their competencies in the areas of setting clear outcomes, constructing calendars of activities, and choosing appropriate content to meet training goals. Modular training, however, could be expensive to deliver, given the expense of air travel required to travel between most Caribbean countries. Distance learning methods, where possible, may prove to be a more cost-efficient means of delivering focused professional development for each of the surveyed countries.

The wide diversity that is apparent in both the identified highest priority training needs and lowest areas of needs raises a larger issue. The regional extension staff in the Caribbean is too small, and the food production system too similar, to have such a wide variation in an area of competencies as important as programming. There is need

for the harmonization of extension program approaches and methods across the region. At the governance level, perhaps through the agriculture office in the Caribbean Community (CARICOM) secretariat, a plan for the modernization of extension across member countries could go a long way in streamlining approaches, methods, and techniques to be used. Given the commonalities that exist in the nature and objectives of food production in the region, a regional plan that will improve extension education should be developed that still recognizes the individual needs of each country.

Liles (2004) suggested that organizations need to identify core competencies required by staff and develop training programs to improve capacity. Buford, Bedeian, and Lindner (1995) indicated that competencies should be viewed as qualifications necessary for performing essential job functions – such as programming. If extension officers do not perceive themselves to have the necessary qualifications, then certainly a strong training program for developing them must exist in order for extension to flourish.

This study was limited to three countries, which is an insufficient foundation for any future regional planning efforts. A needs assessment should be done to assess the current situation of all extension officers in the CARICOM region and to more comprehensively assess training needs in programming, but also competency areas beyond programming, including technical knowledge. Such a needs assessment would inform the construction of a regional training project that would enable the development of technical capacities equally across the region.

Not since the 1970s when the Caribbean Agricultural Extension Project (CAEP) was underway has there been a regional effort to focus extension. Since then, countries have had to develop extension on their own, resulting in different focuses, methods, and techniques among countries. Swanson and Rajalathi (2010) indicated that a system staffed by skilled personnel is essential if the desired impact of improving the livelihoods of most of the region's food producers is to be achieved. For increased food production and increased exportation, extension officers must be competently prepared to provide the necessary educational interventions needed by food producers.

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Using a Study Abroad Experience as the Stimulus to Globalize the Secondary Agricultural Education Curriculum

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Abstract

The purpose of this case study was to document how one preservice agricultural education teacher's study abroad experience was used as a stimulus to globalize a secondary agricultural education curriculum. The lead author participated in a three-week study abroad trip to Costa Rica focused on sustainable agriculture. Upon returning from that trip the researchers developed a four-lesson curriculum on Costa Rican agriculture with lessons focused on Introduction to Latin America*,* Sustainability*,* Agroforestry*, and* Tropical Crops*. This curriculum was delivered to a group of ninth grade students in an introductory agricultural education course. The students were taught one lesson per week over a four-week period. Students completed pre- and post-tests to assess their knowledge and a curriculum evaluation survey. Test scores doubled after the curriculum implementation. Additionally, students had favorable opinions about the curriculum. The activities undertaken in this project demonstrate a possible approach to expanding the educational impacts of a study abroad experience. The authors recommend that similar approaches be implemented in other contexts to see if the results can be replicated. The activities undertaken in this project appear to be an effective approach to expose a previously unreached group of young agriculturists to global aspects of their subject. The long-term impacts on these students are beyond the scope of this study but should be examined.*

Keywords: Global Education, Study Abroad, Secondary Agricultural Education, Curriculum

Introduction

Agriculture is a global industry that relies on imports and exports of both inputs and products. As the world becomes more interconnected, students are encouraged to prepare to enter into a more internationalized agricultural industry (National Research Council, 2009). Ibezim and McCracken (1994) declared that if students are to compete effectively in the internationalized workforce, they must understand the role globalization plays in agriculture. However, high school students and college undergraduates show a deficiency in knowledge regarding international issues, agricultural policies, people, and cultures (Wingenbach, Boyd, Lindner, Dick, Arispe, & Haba, 2003). This may put students at a disadvantage when they enter into a workforce that is constantly evolving to accommodate global changes (Radhakrishna, Leite, & Domer, 2003). So how can we effectively prepare students to work in a globalized agricultural industry? One common approach has been study abroad experiences for undergraduate students (National Research Council, 2009). However, only 2.5% of undergraduate agriculture students engage in this experience (Food and Agricultural Education Information System, n.d.; Institute of International Education, n.d.). How can the impacts of these experiences be transferred beyond this small group of students? One solution could be capitalizing on preservice agricultural education teachers. For example, this study describes how one preservice agricultural education teacher's study abroad experience was used as a stimulus for globalizing a curriculum for secondary agriculture students. The approach used in this study could serve as a model for future study abroad programs and curriculum development projects involving preservice agricultural education teachers. Furthermore, with over 650 preservice agricultural education teachers graduating a year in each of the last 10 years from U.S. universities (Kantrovich, 2010), the activities undertaken in this study have considerable opportunities for expanding the impact of study abroad experiences.

Theoretical Framework

This study was framed using the *Framework for Understanding Teaching and Learning* (Darling-Hammond & Bransford, 2005). This framework proposes that teachers must have knowledge of: (a) the learners, (b) the subject matter and curriculum goals, and (c) teaching. This study specifically focused on *knowledge of subject matter and curriculum goals*. How can we advance the knowledge of teachers to broaden curriculum goals? Specifically in this study, this was conceptualized as *how could preservice teacher experiences on a study abroad program be used to globalize the secondary agricultural education curriculum?*

In preparation for this study, the existing literature was reviewed to see what was known about using a globalized curriculum to prepare secondary students to work in the global agriculture industry. "Global perspective is a relatively new concept; therefore, the research literature on this topic is embryonic" (Zhai & Scheer, 2004, p. 40). The results of the authors' literature review supports Zhai and Scheer's statement. Consequently, the literature that exists focuses primarily on post-secondary schools; little research has been conducted at the secondary school level. With that in mind, the researchers organized the existing literature into three themes: (a) developing global competence in secondary students, (b) student attitudes towards international agriculture, and (c) globalized curricula in secondary schools.

Developing Global Competence in Secondary Students

Pre-collegiate agricultural workforce development in the United States often happens through high school agricultural education programs (Phipps, Osborne, Dyer, & Ball, 2008). However, agricultural education programs are not keeping pace with the rapid demand for global education (Conners, 2004; Elliot & Yanik, 2002). High school participants of a Costa Rican travel seminar thought that learning about international agriculture was important, not withstanding that they received little instruction about the subject in their secondary agricultural education program (Connors, 2004).

Students' Attitudes Towards International Agriculture

Zhai and Scheer (2004) investigated undergraduate agriculture students' attitudes towards international agriculture at The Ohio State University and found that the undergraduate agriculture students had a moderate global perspective. Only two studies were found that investigated international agriculture at the secondary level. To that end, Radhakrishna et al. (2003) examined high school students' beliefs and attitudes regarding international agricultural concepts. Radhakrishna et al. found that students believed they needed more information on agriculture from a global perspective and curriculum was needed that would prepare them for the globalization of agriculture. Additionally, Radhakrishna et al. reported that more research concerning the attitudes, perceptions, and knowledge of students was necessary, as was developing and assessing international agricultural curricula.

Connors (2004) found high school students who participated in a Costa Rican travel seminar had positive attitudes towards learning about international agriculture and traveling. The students were also in agreement that knowledge in global agriculture would be important for their careers and would benefit them in the future. Furthermore, the students indicated international agriculture should be taught at the secondary level, which is consistent with Radhakrishna et al. (2003).

Globalized Curricula in Secondary Schools

The education system in the United State often adapts to social movements by changing curricula to match current reform efforts. In the past decade, various reform movements have prompted educators to incorporate international concepts into high school curricula (Elliot & Yanik, 2002). However, this does not mean there is widespread agreement on the best way to globalize the high school curriculum, or even that the curriculum needs to be globalized.

Gibson and Hillison (2005) stated that there is great variation in approaches to delivering instruction of international agriculture. This could be due to a narrow interpretation of agriculture that in turn can lead to little flexibility in the subject matter of secondary agricultural education programs (Acker, 1999). Methods to increase global knowledge include study abroad programs and interactions with international students. However, money, time, diversity of the school population, and number of participants are all factors that limit the effectiveness of such methods. An alternative method is to develop curricula based on agriculture from a wide variety of countries to "integrate…experiences into the broader agricultural curriculum" (Boyd, Felton, & Dooley, 2004, p. 64).

An examination of the *National Agriculture, Food and Natural Resources (AFNR) Career Cluster Content Standards*

(National Council for Agricultural Education, 2009) revealed only a few standards focused on global agricultural issues. Additionally, reviewing the Florida curriculum frameworks (Florida Department of Education, 2012) for agricultural education showed little emphasis on global agricultural issues. There appears to be a little or no globalized agricultural education curriculum available at the secondary level, indicating a pressing need for expansion in order to prepare high school agriculture students for the globalized industry.

Few international curricula are available for high school agriculture teachers. The development of such curricula has tremendous future application (Elliot & Yanik, 2002; Ibezim & McCracken, 1994). For students to be fully prepared to enter into the global workforce, development of such curricula is essential (Radhakrishna et al., 2003). Using curricula like this has the potential to immerse high school agriculture students into a different culture and enables them to learn about international agricultural issues.

Research Purpose and Objectives

The purpose of this study was to investigate an approach for increasing the impact of a study abroad experience. The research objectives were to: (a) describe changes in knowledge of Costa Rican agriculture of secondary agriculture students as a result of the globalized curriculum and (b) describe student perceptions of the globalized curriculum.

Methods

This study employed a case study approach to document the outcomes of an effort to increase the impacts of a study abroad experience through the development and implementation of a secondary-level curriculum (Gall, Gall, & Borg, 2003). Data collection included a pre-/post-test knowledge assessment and an attitudinal survey.

Context

This project began with the lead author attending a three-week study abroad program in Costa Rica. At the time of this study, the lead author was a preservice agricultural education teacher in the final year of studying agricultural education at the University of Florida. The program was sponsored through the university and titled *Sustainable Agriculture and Social Entrepreneurship in the Tropics: Experiential Learning in Costa Rica with EARTH University.* Over a three-week period the lead author studied animal science, soil science, agroforestry, and sustainability. Throughout this experience, pictures, interviews, and notes were recorded to provide background research for a curriculum based on Costa Rican and Latin American agriculture.

Curriculum Development

Upon return from the study abroad program, curriculum development began. The data collected from Costa Rica, supplemented with additional information collected by the researchers, was used to develop the curriculum. The curriculum was developed using procedures taught in AEC 4202, *Curriculum Development and Assessment Techniques in Emerging Agricultural Technologies* at the University of Florida. The content of this course was developed based on concepts and procedures outlined by Newcomb, McCracken, Warmbrod, and Whittington (2004) and Phipps et al. (2008). Based on the data collected, the researchers decided the curriculum should be designed for a ninth grade agriculture course and focus on four themes titled *Introduction to Latin America, Sustainability, Agroforestry,* and *Tropical Crops.*

Learning objectives were developed to align with the National Council for Agricultural Education's (2009) *National Agriculture, Food and Natural Resources (AFNR) Career Cluster Content Standards*. Instructional material included PowerPoint presentations, videos, readings, individual writings, and cooperative learning activities. The lesson plans were reviewed by three doctoral students in agricultural education at the University of Florida and revised accordingly. The curriculum was designed for one instructional week or five 50-minute class sessions. Four days were devoted to instruction, and one day was used for evaluation. The lesson titles included: *Latin America and Common Agricultural Practices*, *Sustainability*, *Agroforestry*, and *Tropical Fruits*, *Companies and Business*.

The curriculum was designed to give students a brief introduction to international agriculture from a tropical perspective in Latin America. The purpose of the objective for *Lesson 1: Introduction to Latin America* was to introduce students to the region. This lesson addressed the *AFNR* standard: *PS.03.04.01.a. Explain sustainable agriculture and objectives associated with the strategy*. The lesson plan contained a PowerPoint presentation, "Welcome to Latin America, Aquaculture, and Organic Farming." In addition, video clips and websites were used. The lesson plan was created in the lecture/note-taking format.

Lesson 2: Sustainability focused on defining the term sustainability and provided each student with the opportunity to form an opinion about sustainable agriculture. This lesson addressed the *AFNR* standard: *PS.03.04. Apply principles and practices of sustainable agriculture to plant production.* This was done using a lecture that included a PowerPoint presentation, the creation of a newspaper worksheet called *The Sustainable News*, and essay writing. The lesson plan included lecture/note-taking, cooperative learning, and individual learning activities.

Lesson 3: Agroforestry focused on defining four agroforestry practices, inferring their advantages, and being able to visualize how each practice works. This lesson addressed the *AFNR* standard: *NRS.03.01. Produce, harvest, process and use natural resource products*. The lecture was presented through PowerPoint to the students. In addition, students were asked to read a handout describing the practices in greater depth and were organized into groups to infer advantages of agroforestry. Lastly, the students applied the practices to hypothetical scenarios and matched agroforestry practices to a map counterpoint. The lesson plan had a higher proportion of cooperative learning compared to individual learning activities in the other three lessons.

Lesson 4: Tropical Fruits, Companies, and Business was designed to introduce students to tropical crops such as pineapples, bananas, coffee, and cacao, which are imported into the United States from Costa Rica. This lesson addressed the *AFNR* standard: *CS.04.01.01.a. Examine performance and goals to appreciate professional organizations and industries within AFNR.* Using a lecture with a PowerPoint presentation, students were shown pictures of each crop and asked to identify the particular tree and fruit. Students were also shown short video clips produced by the Costa Rican Doka Coffee Estate. Additionally, a PowerPoint presentation on the processing of cacao was presented. A handout containing the logos of companies that import tropical crops was given to students to illustrate that these major brands conduct business globally. A cross-cultural quiz was given orally to students to increase their awareness of the differences in business practices around the globe. The lesson plan was primarily

cooperative learning–oriented, but some individual activities were utilized.

Implementation

A rural high school in Florida was chosen to participate in the study due to its proximity to the University of Florida and because the school offered a ninth-grade introductory agricultural education course. Thirty students were enrolled in the course. Based on the parameters outlined by the high school at which the curriculum was implemented and the protocol approved by the Internal Review Board (IRB) at UF, no formal demographic data were collected by the researchers. Based on informal observation, a majority of the students were white with slightly more males than females.

Informed consent forms were collected from 24 of the 30 students enrolled in the class (80%). Of the 24 students in the accessible sample, complete data were collected from 20 of the 24, yielding a response rate of 83.3%. The other data was rendered ineligible due to absences and/or students not returning IRB forms.

Curriculum implementation and data collection for this study occurred in November, approximately five months following the study abroad experience. Based on the limitations imposed by the high school teacher, the curriculum was implemented over a four-week period, using 1 class session per week for delivery of the curriculum. Prior to beginning the research, students were briefed about the project and what was expected of them should they choose to participate. They also received IRB parental consent forms with instructions to return the forms signed to their teacher the following Monday.

Prior to the curriculum implementation, students and the teacher filled out the IRB consent forms and took the pre-test (Oct. 28). On Mondays and/or Wednesdays (Nov. 4, Nov. 9, Nov. 16, Nov. 18) students were instructed for fifty minutes in international agriculture using the designed curriculum. Five days after the completion of the curriculum implementation (Nov. 23), the students were given five minutes to review their notes and then took the post-test, which was followed by the curriculum evaluation survey.

Instrumentation

Two instruments were used to assess the stated learning and research objectives: a knowledge test and an attitudinal survey to evaluate the curriculum. Both instruments were administered face-to-face by the lead researcher. The knowledge test consisted of 21 questions with a point scale of 100 possible points. The following types of questions were on the knowledge test: (a) 11 multiple-choice items, (b) 2 short-answer items, (c) 2 true or false items, (d) 2 list items, (e) 3 matching items, and (f) 1 essay item. The knowledge test was designed to assess students' knowledge on agroforestry practices, general knowledge of the Latin American region and cross-cultural business awareness, the concept of sustainability and the feasibility of implementing sustainable agricultural practices, and tropical crops produced in Latin America. The researchers developed this assessment by creating questions based on the learning objectives of each lesson. The assessment was reviewed for face and content validity (Gall et al., 2003) by an agricultural education professor at the University of Florida who teaches educational assessment and has prior experience teaching similar content.

A researcher-developed curriculum evaluation survey was used to assess students' opinions of the curriculum. The survey consisted of seven statements about the effectiveness of the curriculum and an open-ended question. Student response was measured using a five-point rating scale (1 = *strongly disagree* to 5 = *strongly agree*) for

the effectiveness statements, and the open-ended question asked for recommendations, comments, and concerns about the curriculum. Items in the survey were developed based on the researchers' interest in evaluating specific aspects of the curriculum. The survey was reviewed by a panel of faculty in agricultural education familiar with survey development for face and content validity (Gall et al., 2003). The post-hoc reliability coefficient alpha was .77.

Data Analysis

The knowledge pre-/post-test scores were converted from a point scale into percentages in order to analyze the data. The original test was based on a scale from 0 to 100. After analyzing the data, one question was excluded due to confusion by the students. The final point scale was 96 instead of 100 points. The knowledge test was analyzed using descriptive statistics, and results were rounded to the nearest whole number.

Limitations

Due to the nature of the non-probalistic sample, the results of the study are limited to just this group of students. The findings of this study are also limited because students may have had other opportunities (other than the curriculum) to learn about Costa Rican agriculture during the four-week period between the pre and post test. Another limitation of this study is that the protocol was implemented over a four-week period, so the long-term impacts of this study are unknown. As with other research with similar designs, this study was limited by participant attrition. A final limitation noted by the researchers focused on participants. This sample was predominately white, so the impact of this curriculum on a more diverse student group is also unknown.

Results

Objective 1: Describe Changes In Knowledge of Costa Rican Agriculture

Prior to the curriculum implementation, students completed a pre-test knowledge assessment. The pre-test score for the knowledge test was 30% (*SD* = 7.3). The range of the pre-test was 17% to 44%. On the written knowledge test, students left on average 60% of the open–ended items blank. Fifty percent (*n* = 10) of students indicated they supported sustainable agriculture but did not give reasons for their support. Forty five percent (*n* = 9) of students left the essay blank, and one student wrote he/she did not support sustainable agriculture because he/she knew nothing about it.

Students completed a post-test knowledge assessment (same test as the pre-test) at the end of the four-week protocol. The post-test score was 61% (*SD* = 18.57). The range for the post-test was 26% to 90%. Figure 1 shows students' percentages of correct answers on the pre test and post test. Students showed substantial improvement, with the majority of students doubling their scores. Sixty five percent of students (*n* = 13) support sustainable agriculture; 15% of students (*n* = 3) did not support sustainable agriculture. In addition, 15% (*n* = 3) left the question blank and one student was undecided. Responding students supported their opinions with clear arguments.

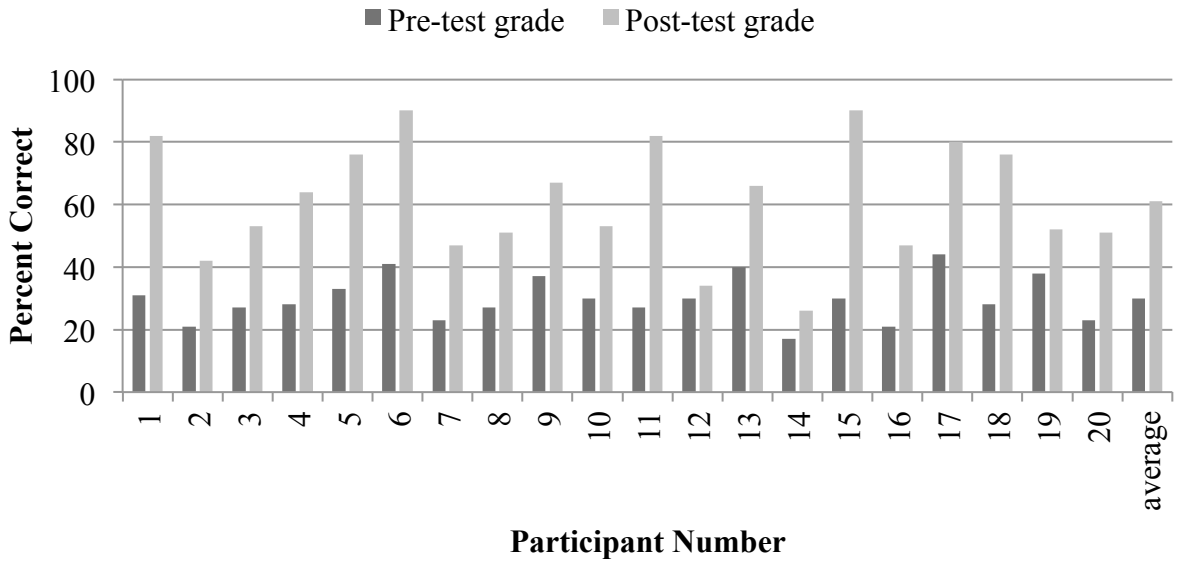

Figure 1. Comparison of each student's percent of correct answers on the pre/post test.

Objective 2: Describe Student Perceptions of the Curriculum

The curriculum evaluation survey used a five-point rating scale (1 = *strongly disagree* to 5 = *strongly agree*) to evaluate the curriculum (see Table 1). Overall, students had a slightly positive opinion about the curriculum. No students strongly disagreed with any of the statements. The means ranged from 3.25 (*SD = 1.02)* (*the assignments challenged me)* to 4.25 (*SD = .85*) (*I was able to ask questions and participate during the lessons*). No statements had means below 2.99.

Students also responded to an open-ended question on the survey asking for recommendations, comments and concerns about the curriculum. Fifty percent of students (n = 10) responded to the question. Student responses were categorized into: *liked it* (n = 4), *lessons were well prepared* (n = 3), *it was ok* (n = 2), and *not challenging* (n = 1).

Table 1. Student Curriculum Evaluation Survey

	Frequency						
Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	*M*	*SD*
I was able to ask questions and participate during the lessons.	0	1	2	8	9	4.25	.85
The directions were clear and easy to follow.	0	0	4	9	7	4.15	.75
The test questions were taken directly from what was learned in class.	0	1	4	10	5	3.95	.83
I learned a lot about international agriculture.	0	2	3	10	5	3.90	.91
The activities achieved their objectives.	0	1	5	10	5	3.85	.81
I found the lessons to be engaging and interesting.	0	2	8	5	5	3.65	.99
The assignments challenged me.	0	5	8	4	3	3.25	1.02

Conclusions

Objective 1: Describe Changes In Knowledge Of Costa Rican Agriculture

The curriculum designed to increase students' knowledge in international agriculture was moderately successful. Every student showed an increase in knowledge after participating in the curriculum implementation, on average doubling their score. Although the final knowledge post-test scores averaged 61%, this was an improvement over the pre-test. Determining the exact reason for this level of mastery is beyond the scope of this research project and could be considered for future research. Perhaps differences in student ability or motivation could explain some of the variation.

When examining individual lessons, students did well on the agroforestry and the tropical crops lessons. However, based on test scores there appears to have been some confusion between sustainable agricultural practices and agroforestry practices; students failed to differentiate between the two practices. They were able to develop their own opinion about the feasibility of sustainable agriculture and displayed critical thinking skills when forming their opinion. Several students changed their previous opinion about sustainable agriculture after curriculum implementation. Those who kept their same opinion also gave logical reasons for doing so.

Objective 2: Describe Student Perceptions of the Curriculum

Overall, students had a fairly positive opinion about the curriculum. The curriculum achieved the objective of increasing knowledge in international agriculture. Students indicated the most problematic aspect of the curriculum was that the assignments were not challenging enough. This should be addressed when the curriculum is revised. Furthermore, the students felt they were able to participate in class and ask questions. This allowed for exploration and may have increased interest in the topic. In regards to the knowledge test, a majority of students agreed the assessment was aligned with the curriculum objectives.

Discussion, Recommendations, and Implications

In this study, the knowledge test scores indicated that the curriculum was successful at expanding the impact of a study abroad experience. This may indicate that utilizing preservice agricultural education teachers (who participate in a study abroad experience) to develop and teach globalized lessons may be an appropriate means of broadening the impact of study abroad experiences. Furthermore, this approach of utilizing preservice teachers and the curriculum they produced may advance the knowledge of preservice and current agricultural education teachers while broadening the curriculum goals at the secondary level. To that end, developing knowledge of subject matter and curriculum goals was a one component of Darling-Hammond and Bransford's (2005) *Framework for Understanding Teaching and Learning*. If this approach proves successful in other settings, the impacts on developing global awareness in preservice and current teachers, developing globally integrated curriculum, and ultimately in preparing globally competent students for careers in agriculture could be significant.

Based on the activities and findings of this research project, the following recommendations are offered. First, this approach appears to be a promising way to develop globalized curricula. This approach should be replicated using different study abroad experiences, preservice teachers, and

secondary students, because the nature of the current study does not allow for generalizability. Thus, only through replication will the true impact be determined.

Based on the results of this study, the researchers suggest that the efforts to develop globalized curricula for secondary students should be increased. This is supported by the recommendations of Radhakrishna et al. (2003), who stated that schools should continue their efforts to incorporate relevant international concepts into the curriculum. Additionally, efforts should be made to ensure that all new curricula developed for secondary education have applicable international foci. This will help prepare students to enter a more globalized workforce, affording them a foundation of international concepts.

The findings of this study also lend themselves to suggestions for faculty who develop and lead study abroad experiences. Often the activities involved in such experiences end shortly after the conclusion of the experience. The researchers recommend that faculty proactively build in assignments that require students to create materials that could be used to develop or supplement curricula with global examples.

The curriculum developed for this study focused on Costa Rican and Latin American agriculture. The United States is a major player on the world stage and interacts with countries from every region. Connors (2004) stated that students received little instruction at the post-secondary level regarding international agriculture. In order to compensate for this shortage of globalized agricultural lesson plans, the researchers recommend that curricula should be developed for other regions of the world in addition to Latin America. In order to fully prepare students to enter the global economy, students should have knowledge of multiple regions around the world. Furthermore, lessons should be developed focusing on countries with which the United States has particularly close dealings (e.g., China, Mexico). This would give students a more in-depth understanding of these countries and their global positions. These lesson plans focusing on individual countries can be created as a component of a larger global curriculum.

The curriculum that was developed for the purpose of this research project should be revised based on observations and feedback from the students who participated in this study. While the curriculum was successful in increasing students' knowledge of global agriculture, the test scores were considerably less than perfect. The curriculum should be revised by emphasizing components students struggled to understand, making some assignments more challenging, and incorporating more opportunities for feedback from students. The knowledge test should be revised by rewriting questions that were unclear to students. The revision of the curriculum should focus on increasing student comprehension while making the assignments more challenging.

This revised curriculum should be taught and disseminated on a broader scale. Different results may be obtained if the study is conducted in an urban setting or a different region of Florida. Further research should be conducted using a larger sample and a more diverse population of high school students.

In summary, if the United States is to compete in the global market, students at all levels should be prepared to work in an international environment (National Research Council, 2009). One means of preparing students is to incorporate global agricultural concepts into the secondary curricula. More research is needed to understand student attitudes towards international agriculture, and international

curricula need to be developed. The *Association for International Agricultural Education and Extension* and the *American Association for Agricultural Education* should play a lead role in this expansion of international agricultural education at the secondary level and provide opportunities for researchers to further explore this topic.

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Manuscript Submission Guidelines

The *JIAEE* is the official refereed journal of the Association for International Agricultural and Extension Education (AIAEE).

General Requirements

Microsoft Word files only may be submitted. All manuscripts must indicate the type of article—Feature; Commentary; Tools of the Profession and Book Review—on the title page of the manuscript. **All manuscripts must be submitted online** at http://jiaee.ft.expressacademic.org. Manuscripts cannot be published or be under consideration for publication in another journal. The *Journal of International Agricultural and Extension Education* (*JIAEE*) follows the standards set forth in the *Publication Manual of the American Psychology Association* (6th ed.). Online manuscript submission guidelines are posted at http://www.aiaee.org/guidelines.html. **Authors must follow these formatting requirements** prior to submitting manuscripts to the *JIAEE*.

Feature Articles

A **title page** with manuscript title, authors' names, institutions, complete addresses, telephone and fax numbers, and e-mail addresses is required. The manuscript must include an **Abstract** (a succinct idea of the article's content) not exceeding 250 words, followed by 5-7 **Keywords** (selected from a list of topics available on the submission log on page), **Introduction**, **Theoretical/Conceptual/Operational Framework**, **Purpose and Objectives**, **Methods**, **Findings/Results**, **Conclusion**, **Recommendations/Implications**, and **References**, or similar appropriate headings. There is no fee charged for submitting a feature article. Feature Articles cannot be longer than **20 double-spaced** (12 point font) pages (not including the title page) with **one-inch margins** on all sides.

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Commentary Article manuscripts are submitted online. A **title page** with manuscript title, authors' names, institutions, complete addresses, telephone and fax numbers, and e-mail addresses is required. The article must include an **Abstract** not exceeding 250 words. Please include 5-7 **Keywords** (selected from a list of topics available on the submission log on page) to describe your manuscript. Commentary Articles should be no longer than **eight double-spaced** (12 point font) pages (not including the title page) with **one-inch margins** on all sides.

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Call of Managing Editor-Elect
Journal of International Agricultural Extension Education

AIAEE's Board of Directors is accepting nominations (including self-nominations) for the position of **Managing Editor-Elect** *Journal of International Agricultural and Extension Education*. Nominations should include a letter of interest by the nominee and the nominee's curriculum vitae. The Managing Editor-Elect will be expected to move into the roles of Executive Editor and Past Editor. The individuals must have published in *JIAEE* in the last 5 years. Preference is given to those having served on the Editorial Board.

Term as Managing Editor: January 1, 2014-December 31, 2015 – (Volume 21 & 22)
Managing Editor: Manages the submission and review process using the Academic Express online system; delegates *Tools of Trade* and *Book Reviews* to Associate Editors.

Term as Executive Editor: January 1, 2014-December 31, 2015 – Amy Harder (Volume 21 & 22)
Executive Editor: Set the overall standards the *Journal* and is responsible for editing each issue, printing each issue, and distributing each issue. Handles all post acceptance issues including page fees, manuscript publication agreements, and library subscriptions.

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Please submit electronic nomination materials **by September 1, 2013** (either in pdf or MS Word) to:

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