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Articles intended for publication should focus on international agricultural education and/or international extension education. Articles should relate to current or emerging issues, cite appropriate literature, and develop implications for international agricultural and extension education. **Manuscripts, or portions of manuscripts, must not have been published or be under consideration for publication by another journal.** Three types of articles are solicited for the *JIAEE*: Feature Articles, Tools of the Profession Articles, and Book Reviews.

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Feature articles focus on philosophy, current or emerging issues, and the methodology and practical application of specific research and appropriate technologies, which have implications for developed and developing countries. For publication in the *JIAEE*, feature articles must pass the *JIAEE’s double blind, referee process*, where peer reviewers evaluate manuscript content and ensure readability. Reviewers are selected from the AIAEE membership. In the double blind, referee process, all references to authors are removed before the manuscript is sent to reviewers. Feature articles may be submitted for peer review a total of three times before they are no longer acceptable for publication in the *JIAEE*. Failure to meet the submission formatting guidelines will result in an automatic first rejection.

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Commentary articles state an opinion, offer a challenge, or present a thought-provoking idea on an issue of concern to international agricultural and extension education, including a published article in the *JIAEE*. These articles are invited by the editors. Tools of the Profession articles report specific techniques, materials, books and technologies that can be useful for agricultural and extension educators in a global context and/or in a country/region. Book Reviews provide insight on current books related to international agricultural education.

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From the Executive Editor

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From the Executive Editor

I am pleased to publish the final issue of Volume 20 of JIAEE. This issue includes five feature articles. Articles relate to unique programs conducted in Central America and Africa as well as to using reflective journals to gain insight into study tours. JIAEE is a window to some of the excellent research and programs members are engaged in throughout the world, and we are pleased to share those efforts through publication.

This is my last issue as Executive Editor of 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. Please offer your continued support to her as she assumes the role of Executive Editor. Appreciation also goes to Dr. Kim Dooley of Texas A&M, who will conclude her role as Past Editor. Dr. Dooley’s advice and support has been greatly valued. It is a pleasure to welcome to the editorial team Dr. Robert Strong of Texas A&M, who will assume the role of Managing Editor in January 2014.

I especially want to thank Amy Smith Muise, who assisted with each issue in formatting and copyediting. Amy is a professional copyeditor. Her attention to detail and sharp eye made every issue the highest quality. I could not have been successful in my role as Executive Editor without her time, talent, and expertise.

Producing a high quality professional journal takes time and commitment. Individuals serving on the editorial team are donating their time and service to the profession to ensure the membership and profession are well represented. Please take the time to thank these individuals for their service.

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 will review responsibly and complete in a timely manner. As members, this is your journal. Your help is needed. Please support the new editorial team as they continue to provide you a quality professional journal.

Sincerely,

Brenda Severs
Executive Editor, JIAEE

An Assessment of the Sasakawa Africa Fund for Extension Education’s (SAFE) Training Program in Mali: Graduates’ Perceptions of the Program’s Impact on Their Professional Performance

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Abstract
The Sasakawa Africa Fund for Extension Education (SAFE) was established in nine African countries to overcome a shortage of qualified extension educators. A study was commissioned on the SAFE program in Mali, where it has operated since 2002. The purpose of this study was to assess SAFE graduates’ perceptions regarding their training experiences and its impact on their professional practices. Human capital, experiential learning, social constructivism, and self-efficacy theories supported interpreting the SAFE graduates’ perceptions of the competencies acquired and the changes they perceived making to their clients’ practices. A purposeful sampling approach was used to survey 50 SAFE graduates. The graduates’ responses were gathered using several types of response scales, including Likert-type. The findings revealed that 80% of the respondents were males in their late forties with an average of 17 years of experience in extension. On entering the SAFE training program, 70% held a Technician degree; 30% held a Diplôme Universitaire de Technicien Supérieur (DUTS; Higher Technician Degree); and seven in ten had majored in agriculture. The SAFE graduates perceived, as outcomes of their training, improvements in their professional competence, in their job category, and in their
clients’ practices. Moreover, graduates perceived they delivered more “extension services” through demonstrations and discussions with male and female clients after their training, but a smaller increase in interactions with dealers and traders was reported. The researchers recommended increasing female participation in the SAFE training program, focusing more on value-chain-oriented curricula, and conducting an assessment of clients’ perceptions of the SAFE-trained extension educators’ impact on their practices.

Keywords: Assessment, Extension, Human capital, Mali, Self-efficacy, Training

Introduction and Conceptual Framework

Education is an investment that improves nutrition, health, and the quality of life overall of individuals and their societies. In Africa, the proper investment of resources to support educational endeavors is of paramount importance to the continent’s future. Many scholars have considered education a lifelong learning process (e.g., Kahler, Morgan, Holmes, & Bundy, 1985; Knowles, 1962; Knowles & Klevins, 1982). Continuing education or in-service training was a capacity building strategy adopted by Sasakawa Global 2000 through the Sasakawa Africa Fund for Extension Education (SAFE) to upgrade the performance of mid-career extension professionals in nine African countries, including Mali (SAFE, n.d.).

For future improvement of the SAFE training program, it was necessary to assess the perceptions of mid-career extension educators (i.e., graduates) who completed the training, especially regarding their views about its impact on their professional behaviors and related impacts on their clients’ practices (Kanté, 2010). That assessment was the purpose of this study. Positing that the most valuable capital are the resources invested in people has its foundation in human capital theory (Cornachione & Daugherty, 2008; Sweetland, 1996). Improvements in income, performance, productivity, and quality services are derived from the resources invested. Human capital theory advocates that education improves the economic capabilities of people (Sweetland, 1996).

Knowles (1962), in describing andragogy, explained that adults had the ability to learn and would learn if certain conditions were satisfied, including motivation, clarity of learning objectives, and personal satisfaction (Kahler et al., 1985; Knowles & Klevins, 1982). In the 21st century, extension professionals need to develop their competence to meet the needs of their clientele, including extension educators in Sub-Saharan Africa (SSA) who frequently serve impoverished and marginalized groups, e.g., smallholder and subsistence farmers. The success of extension’s services entails the professional development of their personnel, such as technical competencies in multiple program areas as well as skills in leadership, communications, and administration. The competencies most extension organizations strive to develop in their staff are diversified but in the main consist of subject matter expertise, process skills, interpersonal skills, as well as competence in program planning, implementation, and evaluation (Cooper & Graham, 2001; Oklahoma Cooperative Extension Service [OCES], 2009; Traoré, 2008). These objectives are consistent with the SAFE training program.

Theoretical Framework

Experiential learning, social constructivism, and self-efficacy were three relevant theories
used to interpret the SAFE graduates’ views on their training experiences, especially in regard to their acquisition of professional competence and its impact. The SAFE training approach links theory to real-life situations and experiential learning opportunities. Kolb (1984) posited that concrete or real-life experience and reflection are central components of experiential learning. Knobloch (2003) stated this may include “real experience, concrete experience, reflective thinking, observational learning, abstract conceptualization, risk and responsibility, active experimentation, and teacher-as-facilitator” (p. 25) approaches. The pillars of experiential learning framed by Knobloch (2003) were “learning in a real-life context that involves learners in doing tasks, solving problems, or conducting projects” (p. 26).

As a part of their training, the SAFE graduates applied participatory principles and approaches to develop projects leading to the resolution of local problems identified by their clients. SAFE calls these learning activities supervised enterprise projects or SEPs (Kanté, Edwards, & Blackwell, 2013).

Social constructivism theory also supports understanding the graduates’ acquisition of professional competence and the related impact on clients’ behaviors, because it explains how knowledge and skills are created through experiences and social interactions (Fevre, Rees, & Gorard, 1999; Navarro, 2008). Scholars (e.g., Ajzen, 1991 and Merriam & Caffarrella, 1999) have posited that social factors and interactions affect people’s decisions to engage in education and training, which are important sources of knowledge and reflection. Navarro (2008) explained that collaboration, team work, communication, and empowerment of beneficiaries were essential features of successful development programs, which implied change agents, such as extension educators, should possess these skills to be effective.

An individual’s perceived beliefs or self-efficacy for his or her ability to organize and manage situations was another theoretical basis of this study. Ajzen (1991) and Bandura (1995) explained that a person’s level of self-efficacy has an influence on his or her self-confidence and ability to act. The professional development experiences of the SAFE training participants were intended to prepare them to solve their clients’ problems. Thereafter, SAFE-trained extension educators were expected to serve as change agents who demonstrated self-efficacy in addressing the challenges of Mali’s farmers.

**Purpose and Objectives**

The purpose of this study was to assess graduates’ perceptions of the SAFE training program in Mali regarding how it impacted their professional performance and their clients’ practices. Four objectives guided the study: (a) describe selected personal and professional characteristics of the graduates (e.g., gender, age, level of education, field of study, and years of work experience); (b) determine the graduates’ views of the program’s impact on their work performance; (c) determine the graduates’ views of the program’s impact on their clients’ practices; and (d) determine the graduates’ views on their delivery of extension services before and after the training program.

**Methods**

A survey questionnaire was used to assess different facets of the SAFE training program and portray the interconnections among the program’s curricula, the competence acquired by SAFE training.
participants through their training, and the graduates’ application of that competence in their jobs as extension educators (i.e., their perceived impact on clients). The study’s participants included SAFE training program graduates in the district of Bamako and seven of the eight administrative regions in Mali. The graduates were extension educators employed by the government of Mali. They included males and females who earned the Maitrise en Vulgarisation Agricole (MVA) degree of the SAFE training program between 2002 and 2009. The program is equivalent to a bachelor of science (BSc.) degree; it is essentially an agricultural extension degree program (Kanté, 2010).

An updated list of SAFE training program graduates in Mali was obtained from the SAFE coordinators; it constituted the sampling frame of the study. Creswell (2005) defined purposeful sampling as the intentional selection of individuals or sites to understand better the phenomenon under investigation. Opportunistic sampling (Creswell, 2005), a form of purposeful sampling, was used to collect the study’s data. The researchers took advantage of the SAFE Graduates’ Alumni Association Annual Conference to survey all of the MVA graduates who participated in that meeting \( n = 23 \). The survey instrument was hand-delivered to the remainder of the sample, i.e., graduates who did not attend the alumni conference, at their workplaces \( n = 27 \).

Although the study’s participants were representative of Mali geographically, because they were selected purposively, caution should be followed if generalizing the findings beyond the graduates surveyed.

The graduates’ responses were gathered using several response scales, i.e., Likert-type, Yes/No questions, one ranking item, and open-ended questions. A panel of experts reviewed the draft instrument to ensure its content and face validity. The panel included Winrock International’s Senior Program Officer for Enterprise and Agriculture, the SAFE West Africa Coordinator, as well as three faculty members in the Department of Agricultural Education, Communications, and Leadership and one faculty member in the Department of Agricultural Economics at Oklahoma State University (OSU). The instrument was developed in English and translated into French for administration.

After obtaining approval of OSU’s Institutional Review Board to conduct research with human subjects, the survey instrument was pilot tested with 12 SAFE graduates. The individuals who participated in the pilot test were not included in the study reported here. Results of the pilot test were used to determine the internal consistency of the instrument, i.e., Cronbach’s alpha, and make adjustments to the items if needed. All of the alphas exceeded .734 except for the scale that measured graduates’ perceptions regarding the frequency of extension services and stakeholder interactions delivered annually after their SAFE training. In the case of that scale, the Cronbach’s alpha reliability estimate was .580.

The survey instrument was hand-delivered to improve the response rate. Warde (1990) contended that response rates are impacted by the procedure of data collection used. In general, a higher response rate may be achieved by more interaction occurring between potential respondents and the people collecting the data (Warde, 1990). Moreover, interpersonal communication channels are more effective in the Malian culture (Kanté, Dunkel, Williams, Magro, Traoré, & Camara, 2009). In addition, postal mailing services and the Internet are either frequently not accessible or not reliable in Mali.

Fifty French version instruments were completed and returned. Thereafter,
the data were entered, analyzed, and reported in English. Descriptive statistics, including frequencies, percentages, modes, means, standard deviations, and mean differences were calculated. Effect size was also calculated, where appropriate, to describe practical importance of the findings.

Findings/Results
Eighty percent of the graduates surveyed were male. Many were in their late forties; their average age was approaching 47. The graduates averaged 17 years of experience in extension. Seventy percent had entered the SAFE training program with a Technician degree; 30% held a Diplôme Universitaire de Technicien Supérieur (DUTS; Higher Technician) degree on entrance. Seven in ten had majored or specialized in agriculture during their post-secondary schooling before the SAFE training.

Professional Competence
Nearly all of the graduates perceived the training had either the highest impact or a high impact on their overall competence as extension educators (see Table 1). The graduates perceived that “extension education principles and methods,” “human relation skills,” and “fundamental sciences” were the SAFE training domains that prepared them the most to help their clients (see Table 2).

Table 1. Graduates’ Perceptions of the SAFE Training’s Impact on Their Overall Competence as Extension Educators (N = 50)

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Table 2. Frequencies and Percentages of Graduates’ Rankings Regarding the Impact of Their SAFE Training by Domains (N = 50)

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<th>High Impact</th>
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<td>Extension education principles &amp; methods</td>
<td>3 (6%)</td>
<td>3 (6%)</td>
<td>6 (12%)</td>
<td>7 (14%)</td>
<td>3 (6%)</td>
<td>28 (56%)</td>
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<td>Human relation skills</td>
<td>2 (4%)</td>
<td>3 (6%)</td>
<td>4 (8%)</td>
<td>9 (18%)</td>
<td>11 (22%)</td>
<td>21 (42%)</td>
</tr>
<tr>
<td>Fundamental sciences</td>
<td>7 (14%)</td>
<td>7 (14%)</td>
<td>3 (6%)</td>
<td>8 (16%)</td>
<td>12 (24%)</td>
<td>13 (26%)</td>
</tr>
<tr>
<td>Administration, management, &amp; leadership skills</td>
<td>12 (24%)</td>
<td>8 (16%)</td>
<td>5 (10%)</td>
<td>8 (16%)</td>
<td>9 (18%)</td>
<td>8 (16%)</td>
</tr>
<tr>
<td>Practical skills</td>
<td>10 (20%)</td>
<td>13 (26%)</td>
<td>10 (20%)</td>
<td>5 (10%)</td>
<td>5 (10%)</td>
<td>7 (14%)</td>
</tr>
<tr>
<td>Technical skills</td>
<td>17 (34%)</td>
<td>5 (10%)</td>
<td>14 (28%)</td>
<td>5 (10%)</td>
<td>4 (8%)</td>
<td>5 (10%)</td>
</tr>
</tbody>
</table>

Note. Due to respondents’ inconsistencies in ranking these items, numbers and percentages are greater than 50 and 100% for some columns and less for others. Impact was measured by the relative frequencies and percentages. Scale: 1 = Lowest impact . . . 6 = Highest impact

Job Category Advancement

All of the graduates were upgraded to an advanced job category, i.e., from category B to A, the highest, after completing the SAFE training. Some of the graduates were appointed to leadership positions or given new responsibilities; however, a few held the same or equivalent positions as before their SAFE training.

Impact on Clients

Nearly two-thirds of the graduates indicated observing changes in clients’ practices that they attributed to their SAFE training (see Table 3). The changes were grouped into two types. The graduates perceived that more of their clients used improved plant and soil nutrient management practices (see Table 4) and other improved inputs and practices after the SAFE training (see Table 6) than before. Paired samples t-Tests revealed that graduates’ perceptions of their clients’ use of improved practices increased significantly post-training (see Tables 5 & 7).
Table 3. SAFE Graduates’ Perceptions on Changes Observed in Their Clients’ Practices Attributed to Their Training

<table>
<thead>
<tr>
<th></th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>33</td>
<td>66.0</td>
</tr>
<tr>
<td>Not sure</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>No response</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4. Graduates’ Perceptions on Their Clients’ Use of Plant and Soil Nutrient Management Practices Before and After the Graduates’ SAFE Training

<table>
<thead>
<tr>
<th></th>
<th>Before SAFE Training</th>
<th>After SAFE Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Chemical fert.</td>
<td>49</td>
<td>2.55</td>
</tr>
<tr>
<td>Compost</td>
<td>47</td>
<td>2.32</td>
</tr>
<tr>
<td>Green manure</td>
<td>47</td>
<td>1.55</td>
</tr>
</tbody>
</table>

Note. Scale: 1 = None; 2 = A few; 3 = Some; 4 = Many; 5 = Nearly all

Table 5. A Comparison of Graduates’ Before and After Perceptions Regarding Their Clients’ Use of Plant and Soil Nutrient Management Practices: Paired Samples t-Tests

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>M Diff.</th>
<th>SE</th>
<th>t</th>
<th>df</th>
<th>Sig.*</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of chemical fert. before training -</td>
<td>.958</td>
<td>.183</td>
<td>5.224</td>
<td>47</td>
<td>.000</td>
<td>.84</td>
</tr>
<tr>
<td>Use of chemical fert. after training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of compost before training - Use of</td>
<td>1.106</td>
<td>.123</td>
<td>9.028</td>
<td>46</td>
<td>.000</td>
<td>1.07</td>
</tr>
<tr>
<td>compost after training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of green manure before training - Use</td>
<td>.761</td>
<td>.136</td>
<td>5.589</td>
<td>45</td>
<td>.000</td>
<td>.68</td>
</tr>
<tr>
<td>of green manure after training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. *p < .05. Effect sizes: small (d = .20); medium (d = .50); large (d = .80) (Hittleman & Simon, 2002)
Table 6. Graduates’ Perceptions on Their Clients’ Use of Other Inputs and Improved Practices Before and After the Graduates’ SAFE Training

<table>
<thead>
<tr>
<th></th>
<th>Before SAFE Training</th>
<th></th>
<th>After SAFE Training</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>Mode</td>
</tr>
<tr>
<td>Improv. Seeds</td>
<td>47</td>
<td>2.26</td>
<td>.87</td>
<td>2</td>
</tr>
<tr>
<td>Improv. post-harvest</td>
<td>46</td>
<td>2.00</td>
<td>.70</td>
<td>2</td>
</tr>
<tr>
<td>technologies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improv. pest mgt. practices</td>
<td>48</td>
<td>1.81</td>
<td>.82</td>
<td>2</td>
</tr>
<tr>
<td>Improv. livestock feeding</td>
<td>46</td>
<td>2.24</td>
<td>.97</td>
<td>2</td>
</tr>
<tr>
<td>practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improv. breeds of livestock</td>
<td>45</td>
<td>2.09</td>
<td>.87</td>
<td>2</td>
</tr>
<tr>
<td>Improv. bee keeping</td>
<td>41</td>
<td>1.56</td>
<td>.78</td>
<td>1</td>
</tr>
<tr>
<td>Improv. fisheries/aquaculture</td>
<td>45</td>
<td>1.47</td>
<td>.62</td>
<td>1</td>
</tr>
<tr>
<td>practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Scale: 1 = None; 2 = A few; 3 = Some; 4 = Many; 5 = Nearly all
**Table 7.** A Comparison of Graduates’ Before and After Perceptions Regarding Their Clients’ Use of Other Inputs and Improved Practices: Paired Samples t-Tests

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>M Diff.</th>
<th>SE</th>
<th>t</th>
<th>df</th>
<th>Sig.*</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of improv. seeds before training – Use of improv. seeds after training</td>
<td>1.468</td>
<td>.166</td>
<td>8.835</td>
<td>46</td>
<td>.000</td>
<td>1.42</td>
</tr>
<tr>
<td>Use of improv. pest. mgt. practices before training – Use of improv. pest mgt pract. after training</td>
<td>1.167</td>
<td>.150</td>
<td>7.785</td>
<td>47</td>
<td>.000</td>
<td>1.13</td>
</tr>
<tr>
<td>Use of improv. post-harvest techno. before training – Use of improv. post-harvest techno. after training</td>
<td>1.174</td>
<td>.143</td>
<td>8.182</td>
<td>45</td>
<td>.000</td>
<td>1.23</td>
</tr>
<tr>
<td>Use of improv. breeds of livestock before training – Use of improv. breeds of livestock after training</td>
<td>1.044</td>
<td>.193</td>
<td>5.406</td>
<td>44</td>
<td>.000</td>
<td>.87</td>
</tr>
<tr>
<td>Use of improv. livestock feeding pract. before training – Use of improv. livestock feeding pract. after training</td>
<td>.844</td>
<td>.193</td>
<td>4.371</td>
<td>44</td>
<td>.000</td>
<td>.72</td>
</tr>
<tr>
<td>Use of improv. fisheries/aqua. pract. before training – Use of improv. fisheries/aqua. pract. after training</td>
<td>.636</td>
<td>.134</td>
<td>4.734</td>
<td>43</td>
<td>.000</td>
<td>.68</td>
</tr>
<tr>
<td>Use of improv. bee keep. before training – Use of improv. bee keep. after training</td>
<td>.641</td>
<td>.178</td>
<td>3.601</td>
<td>38</td>
<td>.001</td>
<td>.57</td>
</tr>
</tbody>
</table>

*Note.* *p* < .05. Effect sizes: small (*d* = .20); medium (*d* = .50); large (*d* = .80) (Hittleman & Simon, 2002)

Regarding graduates’ perceptions of their delivery of “extension services,” they indicated delivering more demonstrations to and guiding more discussions with clients after their SAFE training (see Table 8). Interactions with dealers and traders also increased, but by less.
Table 8. Comparison of Graduates’ Perceptions Regarding the Frequency of Extension Services and Stakeholder Interactions Delivered Annually Before and After Their SAFE Training

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th></th>
<th>After</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Demonstrations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>5</td>
<td>10.0</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>1 to 5</td>
<td>12</td>
<td>24.0</td>
<td>6</td>
<td>12.0</td>
</tr>
<tr>
<td>6 to 10</td>
<td>15</td>
<td>30.0</td>
<td>7</td>
<td>14.0</td>
</tr>
<tr>
<td>11 to 15</td>
<td>4</td>
<td>8.0</td>
<td>10</td>
<td>20.0</td>
</tr>
<tr>
<td>16 or more</td>
<td>14</td>
<td>28.0</td>
<td>24</td>
<td>48.0</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100.0</td>
<td>50</td>
<td>100.0</td>
</tr>
<tr>
<td>Group Discussions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>3</td>
<td>6.0</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>1 to 5</td>
<td>12</td>
<td>24.0</td>
<td>7</td>
<td>14.0</td>
</tr>
<tr>
<td>6 to 10</td>
<td>9</td>
<td>18.0</td>
<td>8</td>
<td>16.0</td>
</tr>
<tr>
<td>11 to 15</td>
<td>6</td>
<td>12.0</td>
<td>10</td>
<td>20.0</td>
</tr>
<tr>
<td>16 or more</td>
<td>17</td>
<td>34.0</td>
<td>21</td>
<td>42.0</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>94.0</td>
<td>47</td>
<td>94.0</td>
</tr>
<tr>
<td>Dealer Interactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>28</td>
<td>56.0</td>
<td>15</td>
<td>30.0</td>
</tr>
<tr>
<td>1 to 5</td>
<td>12</td>
<td>24.0</td>
<td>14</td>
<td>28.0</td>
</tr>
<tr>
<td>6 to 10</td>
<td>3</td>
<td>6.0</td>
<td>11</td>
<td>22.0</td>
</tr>
<tr>
<td>11 to 15</td>
<td>2</td>
<td>4.0</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>16 or more</td>
<td>2</td>
<td>4.0</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>94.0</td>
<td>47</td>
<td>94.0</td>
</tr>
<tr>
<td>Trader Interactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>24</td>
<td>48.0</td>
<td>14</td>
<td>28.0</td>
</tr>
<tr>
<td>1 to 5</td>
<td>11</td>
<td>22.0</td>
<td>12</td>
<td>24.0</td>
</tr>
<tr>
<td>6 to 10</td>
<td>5</td>
<td>10.0</td>
<td>9</td>
<td>18.0</td>
</tr>
<tr>
<td>11 to 15</td>
<td>1</td>
<td>2.0</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>16 or more</td>
<td>6</td>
<td>12.0</td>
<td>8</td>
<td>16.0</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>94.0</td>
<td>47</td>
<td>94.0</td>
</tr>
</tbody>
</table>

Note. aThe Cronbach alpha reliability estimate for this response scale was .580.

In regard to gender-related service delivery, the graduates indicated they informed and trained one to 20 women per year most frequently, however, more than one-third reported professional contacts with 61 or more females annually (see Table 9). Women were trained about how to form associations or cooperatives and on how to access and manage microloans. Other topics for which information was provided included poverty alleviation, income-generating activities, food processing, commercialization and marketing, literacy, gender issues, and health.
Table 9. The Number of Women Clients Contacted Annually by SAFE Graduates for Service Delivery

<table>
<thead>
<tr>
<th>Number of Women Contacted</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>1 to 20</td>
<td>16</td>
<td>32.0</td>
</tr>
<tr>
<td>21 to 40</td>
<td>7</td>
<td>14.0</td>
</tr>
<tr>
<td>41 to 60</td>
<td>5</td>
<td>10.0</td>
</tr>
<tr>
<td>61 to 80</td>
<td>5</td>
<td>10.0</td>
</tr>
<tr>
<td>81 to 100</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>More than 100</td>
<td>9</td>
<td>18.0</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Conclusions, Implications, Recommendations, and Educational Importance

The study’s findings revealed that women were not well represented in the SAFE training program. Only one in five of the graduates was female, which is consistent with SAFE’s long-term trend data (SAFE, 2013). Therefore, SAFE officials should continue to strive to develop strategies to recruit and retain more female trainees. Even though a similar recommendation was made by Kabutha (2007), SAFE’s pursuit of this aim should be renewed.

A relatively small number of female clients were served annually by the SAFE graduates (see Table 9), even though most of Mali’s rural areas have large female populations that play significant roles in food production. Therefore, it is recommended that extension leaders develop policies and undertake actions calibrated to increase the delivery of extension services to more women in Mali. The recruitment of more females to extension may assist in this effort. More training on gender issues and gender sensitivity also may be needed during the SAFE program.

The SAFE graduates reported their training enabled them to develop competence that improved their overall job performance; they perceived their clients were served better as a consequence. Per Ajzen (1991) and Bandura (1995), the graduates’ views represent an improvement in self-efficacy in regard to their job roles. Therefore, it was concluded the SAFE program reached its goal of upgrading the skills of mid-career extension educators in Mali so they could enhance agricultural production and the quality of life of rural clients. In particular, “extension education principles and methods,” “human relation skills,” and “fundamental sciences” (see Table 2) should be included in the SAFE training curriculum going forward.

However, the graduates perceived their training in the domains of “technical skills,” “practical skills,” and “administration, management, and leadership skills” had a lesser impact on their clients. The graduates’ perceptions in this regard may imply the following: Were the courses provided in these domains sufficiently responsive or relevant to the trainees and, by extension, their clients’ needs? Were the courses taught effectively? Did post-training application problems emerge that hindered the graduates in using their knowledge and skills in these areas? These questions warrant additional study by
SAFE officials as well as interested researchers.

The graduates also perceived their clients’ use of plant and soil nutrient management and other improved inputs and practices increased after they completed the SAFE training (see Tables 4, 5, 6, & 7). Moreover, these findings had practical importance. Therefore, it was concluded that the graduates applied their improved competence in these areas to make positive changes in clients’ practices. This conclusion is in agreement with SAFE’s training assessments in Ethiopia and in Ghana (Kabutha, 2007; Owens, Zinnah, Annor-Frempong, & Obeng, 2001). Curriculum including these topics should continue to be taught.

In addition, the graduates perceived they delivered more services to their clients after the training than they did before, including more demonstrations and group discussions (see Table 8), which exemplify principles of social constructivism (Navarro, 2008; Fevre et al., 1999). Demonstrations are also a form of “observational learning,” as described by Knobloch (2003). Owens et al. (2001), from results obtained describing SAFE training in Ghana, found “highly significant [differences between] pre and post training job performance competencies” (p. 4). The competencies Owens et al. (2001) identified as being capital to the job performance of extension educators in SSA also included demonstrations and group discussions with clients.

In this study, however, the graduates’ interactions with input dealers or traders, i.e., representatives of market forces, changed less substantially after their SAFE training when compared to that of exchanges with clients (see Table 8). These findings should be explored, considering the potential that extension professionals hold for linking farmers to other actors in the value chain system (Akeredolu, 2008). In an era of pluralistic extension services, extension practitioners should be skillful enough to assist in making these connections. To this end, Swanson (2008) explained, “[i]t should be noted that there is growing recognition that markets, not technology, have become the primary driver for agricultural development in many countries” (p. ix).

Based on Swanson’s (2008) assertion, SAFE officials should ensure their training program prepares graduates to link farmers to the stakeholders and actors who augment the agricultural value chains in Mali. In accord with this recommendation, SAFE officials have revised their training curriculum to be more value chain-oriented and are considering other related changes to their program (Akeredolu, Annor-Frempong, & Kanté, 2012; SAFE, 2013).

Beginning with its inception in 1993, the SAFE training program for mid-career extension professionals has been established in nine African countries (SAFE, 2013). However, before this study, only rather limited assessments were conducted on the training in Mali. This study, therefore, serves to inform SAFE officials about the training’s primary output, its graduates, and gain some measure of the training program’s outcomes (Hoffman & Grabowski, 2004) based on the graduates’ perceptions of their impact on clients’ behaviors. Nonetheless, impact studies with the graduates’ clients should be a priority for future research.

The findings of this study support and, in some cases, complement existing information about the accomplishments and challenges of the SAFE training program in SSA (e.g., Deola, 1999; Duo & Bruening, 2007; Kabutha, 2007; Knipsheer, 1999; Kroma, 2003; Mutimba, 2003; Owens et al., 2001; SAFE, 2013) with particular relevance to Mali. Other researchers, as well as practitioners, may draw on aspects of this study when planning future investigations or if designing similar training programs. This
study revealed that the graduates benefited through job advancement and that graduates perceived the training helped them to address some of their clients’ problems. The value proposition of human capital theory, i.e., that education is an important investment in people who stand to generate economic benefits for society (Sweetland, 1996), was supported by the results of this study. Moreover, the findings of this assessment can be used for comparison purposes with future evaluations in the SAFE training network across SSA.

References


Interpreting educational research: An introduction for consumers of research (3rd ed.). Columbus, OH: Merrill Prentice Hall.


Computer Training of Rural Central American Teachers: Opportunities and Challenges

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Abstract
Quality education training in the Central American region is in great need of improvement to keep up with the educational rigor of other countries. While the use of information communication technology (ICT) can help improve training by giving students and teachers diverse learning opportunities, many rural and subsistence agricultural communities lack both resources and understanding of ICT. The purpose of this study was to describe Central American public school teachers’ perceptions of computers in education in their home countries. Sixty-two teachers served as respondents through their participation in the USAID program, Cooperative Association of States for Scholarships (CASS). The CASS program, located at Palo Alto Community College in San Antonio Texas, is a yearlong program consisting of teaching from CASS instructors and practicum with local dual language schools.

The study instrument included three components: (a) computer knowledge growth, (b) home country worksite conditions, and (c) participants’ future plans. Respondents showed improved computer skills as a result of CASS training. Data revealed minimal to no ICT resources available in home country communities. Respondents shared their belief that the implementation of ICT is a critical need in their countries’ academic efforts. Upon completion of the program, these Central American teachers reported being equipped to function as change agents in their rural and subsistence agricultural communities. A longitudinal study focusing on teacher impact within their local communities is recommended.

Keywords: Computers, ICT, Education, Central American, Rural schools
Introduction

The term “digital divide” is difficult to define. It is not the measure of only one type of information communication technology (ICT), but rather of a combination of many types of technologies and their rates of diffusion among the population (Billion, Lera-Lopez & Marco, 2010). One definition of the term states that the digital divide exists between the “haves” and the “have-nots” of ICT, where there is delay in the diffusion of connectivity to information technology (Ferro, Helbig, & Gil-Garcia, 2011).

Distribution of ICT is greatly affected by economic levels existing in Latin American countries. Hilbert (2009) studied the comparison of household spending rates and the cost/availability of Internet access and found that one way to shorten the digital divide in Latin America is for ICT prices to decrease with the implementation of effective practices, such as computer donation programs, cheaper cell phones, and more public access to Wi-Fi. This same study used an analogy of public transportation to illustrate the future of ICT in low economic regions. Many transportation issues are met by well-established busing systems instead of private vehicles. Similarly, people of developing countries who use ICT in a more public access manner (e.g., perhaps through Internet cafes or public access Wi-Fi) are able to meet their ICT needs instead of paying for personal access to Internet in their homes. An individual’s ICT needs may be met, but not as conveniently as they would be met in developed countries (Hilbert, 2009).

While many consider physical barriers such as access to ICT as the greatest obstacle to overcoming the digital divide, cultural factors affecting ICT perceptions and encouraging ICT literacy are equally vital to the success of any well-intended government aid project. Warschauer (2002) presented examples that exist where ICT projects eventually failed because of lack of interest and understanding by their receiving communities. ICT project success requires competent leaders, individuals willing to learn more about ICT, and individuals prepared to put ICT into action. For example, set-up costs, time, access to resource material, and administrative policy were found to most likely impede distance education training, which heavily utilizes information and communication technology, for extension agents in Trinidad and Tobago (Dolly & Kissoonsingh, 2006). Additionally, Harder and Lindner (2008) focused on the use of a web-based resource for agricultural extension agents in Texas. The authors concluded that “time for training” was a major factor in adopting the technology, while lack of access to the Internet was less of a factor.

Quality education training in Central American rural schools is in great need of improvement to equal the rigor that other countries have in their educational systems. A similar situation in rural China has been described where teachers in secondary schools specializing in agriculture desired to have higher knowledge and skills and especially lacked experience in educational technology. It was noted that “technology is used [more frequently] to overcome limitations and obstacles in teaching” (Shao & Bruening, 2005, p. 40). Overall, training methods for teachers in Central American schools need to be improved. Often, teachers hastily complete traditional training methods to accumulate certifications that will qualify them to teach a subject. However, traditional teacher training programs are being replaced by innovative, cost effective trends such as classroom-based training, continuing education, group training and networking,
and local level priority training (Navarro & Verdisco, 2000). A rural Chilean project, “Solidarity Project,” is a good example of an innovative training design. Solidarity Project required teachers to participate in a collaboration project to integrate curriculum using ICT in ways that would encourage school children to have more authentic learning experiences and allow the community to benefit from having ICT resources available (Mierzejewski & Quintanilla, 2008).

**Study Background**

The Cooperative Association of States for Scholarships (CASS), a program funded by the United States Agency for International Development (USAID), brings Central American public school teachers to Palo Alto Community College in San Antonio, Texas for one year of training in education methodologies. The CASS program has been at Palo Alto Community College since 2000; its primary function is to equip participants with teaching techniques so they can become more effective in their classrooms and schools, often in rural and subsistence agricultural locations. Program entrance is highly selective within participant countries; only the most effective teachers are chosen (Alamo Colleges International Programs, 2010).

Participating teachers received 35 hours of weekly academic training for the first five months of the program, with six hours weekly in computer training. After initial training, CASS teachers worked in dual language schools (i.e., Spanish-English schools) in the local community where they practiced what they had learned for four days a week. Participants convened on Fridays for specialized training. The yearlong training is 2,000 hours, including workshops, educational courses, English as a second language, community work, visitation to cultural sites, and computer training.

Computer training is a particular focus of the CASS program, especially at the beginning, because some teachers have minimal to no computer experience. CASS participants are taught basic fundamentals of computers, such as keyboarding, Microsoft Office Suite programs, digital camera use, blogging, copyright issues, and best practices for purchasing technology online. Program participants were provided approximately $650 each to purchase ICT equipment (e.g., laptop, projector, digital camera, etc.); instructors helped them select equipment based on price and usability in the participants’ home schools.

Computer use was required throughout the course; participants blogged about their experiences (e.g., traveling, working, living, etc.). Using blogs as a teaching/learning strategy is effective because of its constructional attributes requiring learners to publish their experiences for others to read and make comments about (Ferdig & Trammell, 2004). While reflecting on their experiences in blog form, CASS members reinforced those experiences, received feedback from other members, created online material that could be used for future lessons, and gained more practical ICT skills. One program requirement was to create at least ten lessons using the computer. At the end of the course, CASS members were asked to choose their four optimum lessons, which were referred to as “unforgettable lessons.” These lessons were collected and provided in electronic format to all participants; 68 CASS participants returned to their schools with 272 lessons each.

This paper focused on promoting ICT literacy by considering the training of potential “change agents” (CASS participants). Rogers (1995) defined a change agent as an individual who
influences clients’ innovation-decisions in a
direction deemed desirable by a change
agency. The “change agency” in this case
was the Central American countries’
Ministries of Education that wanted
improved educational systems in rural and
subsistence agricultural communities. The
“clients” in this case were other teachers and
members in communities where CASS
participants worked; the “change agents”
were CASS participants who learned new
educational innovations to encourage
positive impact in their communities.

CASS program participants had
opportunities to integrate authentic
technological learning experiences into their
curriculum, similar to those noted in the
“Solidarity Project” in Chile (Mierzejewski
& Quintanilla, 2008). Makuma’s (2009)
study of ICT use for training student
teachers in Rwanda revealed that “active
ICT users” were motivated because they
wanted to learn more. In Makuma’s study,
the active ICT student teachers were molded
as potential change agents in a country that
supported integration of ICT in education.
Makuma concluded that ICT collaboration
with other teachers could be an effective
means to influence change in the Rwandan
educational system (2009). Similar to the
student teachers in Rwanda, CASS program
participants received ICT training that could
mold them into change agents in their own
communities. If these CASS graduates were
to conduct in-service trainings in their rural
schools upon return, they could prove to be
effective in raising academic standards
among other teachers and students
(Anderson, 2002).

Purpose and Methods

The purpose of this study was to
describe Central American public school
teachers’ perceptions of computers in
education. A descriptive survey design was
used to collect data (Tuckman, 1999).

Sixty-two teachers, mostly from
rural agricultural communities in Central
America, formed a convenient sample from
the population of interest ($N = 68$). Their
participation in this USAID program
afforded a unique research perspective for
the CASS program at Palo Alto Community
College in San Antonio, Texas.

A researcher-developed online
questionnaire was used to gather data. The
questionnaire was reviewed by a panel of
experts familiar with the topic to ensure face
validity. The questionnaire included six
sections: (a) personal information, (b)
computer proficiency before the CASS
program, (c) computer proficiency one week
after starting CASS, (d) computer
proficiency six weeks after starting CASS,
(e) computer proficiency three months after
starting CASS, and (f) community
characteristics and future plans. Four
sections gathered participants’ self-reported
knowledge gains from CASS participation.
Example questions included (a) “How much
time did you use a computer for personal
and/or professional use?” (b) “Describe how
you felt using a computer,” and (c) “What
computer programs did you know how to
use before entering the CASS program and
what programs did you learn while in the
program?” Measures of internal consistency
(reliability tests) were not conducted
because a convenient sample represented the
population of interest, no data were
summed, and no comparisons of sub-group
were made.

Additionally, open-ended questions
were used to collect participants’ work
communities (living conditions) and types of
leadership roles they would engage in after
the CASS program. Demographic questions
included country of origin, age, teaching
experience, workplace conditions and
economic livelihood of their communities.
The questionnaire and instructions were
provided in Spanish to ensure successful
navigation of the online survey. A 91% response rate (i.e., 62 out of 68 teachers) was achieved.

Descriptive statistics were used to report the data. A review of individual responses revealed some respondent errors occurred. Eight participants reported knowing more skills after six weeks than after three months, resulting in two areas (i.e., email and word processing) with declines in skill level (Figure 3). Caution is warranted in generalizing these results beyond the respondent group. While it is possible that skill knowledge could be lost by some respondents, it is also possible that some respondents misunderstood these questions as skill acquirments, or they simply skipped that part of the instrument.

Results

Demographics

Participants’ average age was 36.56 years. Teaching experience averaged 13.70 years. A majority (88%) of CASS participants worked in communities where small-scale subsistence farming was practiced. Countries included El Salvador (32%), Guatemala (29%), Nicaragua (26%), Dominican Republic (10%) and Honduras (3%). Participant comments revealed difficult living conditions in these communities (i.e., lacking electricity and potable water, poor nutrition). Respondents reported that for youth, education was the mechanism to acquiring advanced jobs outside the community. However, in many cases advanced education was not available in their communities and Internet connectivity was noted as not practical or possible.

Participants’ Perceptions of Computer Use

Questions were asked about CASS members’ perceptions of using a computer. For each reporting period, respondents were provided choices about using a computer for personal and/or professional use: “very intimidated,” “a little intimidated,” “I like using a computer, but it is still difficult,” “I like using a computer, and understand everything that I have been taught,” and “I feel very comfortable using a computer, and I am discovering new programs.” Before starting the CASS program, 19% reported feeling “very intimidated” in computer use, while more (27%) felt “very comfortable discovering new applications.” Some participants mentioned they did not know how to turn on a computer, while others were proficient in various programs.

Overall, most participants reported high interest for computer use in their work communities, despite the lack of computer access. During the first three months, both trends for “very intimidated” and “a little intimidated” decreased to 0% and 4% respectively, while the “very comfortable and discovering new programs” increased to 55% (Figure 1). The number of participants who answered that they “liked using computers, but still had difficulties,” increased after the first week of CASS instruction, but steadily decreased as they became more comfortable with different programs. Participants commented that more time learning equated to less time during which they felt intimidated.
The CASS computer training sessions were designed using adult learning theory to guide delivery. Blog use provided opportunities for CASS members to record anecdotal entries and digital photography of new cultural experiences. Adult learning theory suggests that learners universally desire to have control over their learning process (Knowles, Holton, & Swanson, 2005). While blogging helps learners take ownership of their learning, CASS training assisted all learners to reach higher levels of computer proficiency. Figure 1 revealed that by the six-week period, many skills were being mastered, resulting in increased self-guided learning.

**Time Spent on the Computer**

Emphasis was placed on computer training at the beginning of the CASS program because many participants arrived with minimal to no experience and this training had the potential to greatly impact their overall experience within the program. Outside of computer class, some participants had opportunities to practice on computers because CASS funding provided for the purchase of a laptop computer for each participant at the start of the CASS program. Those who used their own computers stated they were more eager to learn computer skills because of access and ownership factors.

Figure 2 revealed two program clusters: four groups who practiced computer skills from “never” to “30–60
minutes per week,” and those who ranged from “one to two” to “more than 5 hours weekly.” The first cluster had a decline after six weeks of training, indicating that as participants progressed through training, there were less people spending little time on the computer. Most participants in this cluster eventually migrated to the higher clusters. There was a sharp decline in the “more than 5 hours per week” category (Figure 2).

![Figure 2. Time spent by CASS participants using computers](image)

**Participants’ Computer Knowledge**

Overall, CASS participants’ skills increased through training. Two areas incurred declines in skill knowledge (i.e., word processing and email); eight of the 62 respondents reported that they knew more skills at the six-week period, than they did at the three-month period. Despite these possible measurement errors, positive skill knowledge growth was evident; participants’ comments supported this finding.

Participants reported knowledge of various computer programs prior to entering the CASS program (Figure 3). Specific skills before entering CASS were email (73%) and word processing (66%). CASS computer training increased learning about blog sites (3% to 80% skill acquirement), PowerPoint (34% to 74% skill acquirement), and digital photography (26% to 64% skill acquirement) at the three-month period.
Participants’ use of computers changed throughout the program. At the start of training, many participants were more focused on using their computers for communication purposes with families in their home countries. They expressed confusion with other specific computer programs. However, as training continued, participants expressed an understanding for new and educational uses for computers.

The greatest skill increase occurred in the creation of blogs (Figure 3). Blogging played a key role in participants’ levels of increased ICT proficiencies. Participating in cultural and scenic tours was part of the CASS program; while CASS participants visited sites, they took pictures and videos that they eventually posted to their blogs. Participants updated blogs by adding journal entries, photos, and videos throughout training. Participants commented on how much they enjoyed putting into practice what they were learning, especially through blogging, because of their practical use of integrating new and interesting experiences in a digital format.

**Participants’ Community Conditions and Needs**

More than one-half (63%) of CASS participants mentioned computers and/or technology as one of the more urgent needs in education in their home communities. Seventy-two percent stated that students in
their home communities have a strong desire to learn more about computers. When asked their opinion, 78% of participants completely agreed (scale: completely disagree to completely agree) that they would be willing to share what they learned with other teachers and students, while 65% completely agreed that other teachers in their home communities wanted to learn more about using computers in their schools (Figure 4).

Figure 4. CASS participants’ present and future outlooks of their own work communities.

**Participants’ Future**

According to their responses, CASS participants revealed a strong willingness to share what they learned with fellow teachers and students in their home communities (Figure 4). Participants reported mixed answers when asked if their governments planned to improve their countries’ information technologies. Similar results were found when asked about plans for their communities; more respondents noted their communities had no plan for technology growth. Many respondents stated that their communities had much more urgent needs.
Conclusions, Implications and Recommendations

The results from this study revealed interesting perceptions of the digital divide. In viewing the digital divide between the “haves” and “have-nots” (Ferro et al., 2011), we found that participants who lacked ICT equipment access could learn and assimilate new computer skills into their own environment after they acquired equipment and training. Indeed, teachers in the CASS program were well suited for learning how to use computers; they left the program with innovative ideas that could be used in their home countries.

Findings revealed that many teachers entered the CASS program with basic computer skills and that CASS training helped accelerate their learning. A possible relationship between CASS program effectiveness and participant ICT growth is noted when viewing similar positive trends in participants’ perceptions (Figure 1) and increasing skills acquired during training (Figure 3).

While it is recognized that individual computer purchases for teachers is not the same as equipping an entire school with computer technology, it was concluded that CASS teachers left the program armed with equipment and training to enrich student learning in their individual classrooms and communities. One year of intense training provided in the CASS program enabled participants to evolve into potential change agents because of increased knowledge of computers and a better understanding of how school needs could be addressed with computer access and use. Knowledge and possession of computer technology helps these individuals to be perceived as innovators in their communities (Rogers, 1995). However, considering the subsistence farming communities’ lack of infrastructure to support ICT implementation, they will need to be creative in their application and use of the computer technology.

CASS participants were purposefully selected from rural and subsistence agricultural locations where economic resources are scarce. About 76% stated that easy access to the Internet was not available at their worksite. However, many of the educational problems shared between El Salvador, Nicaragua, Guatemala, Dominican Republic and Honduras relate to low math and literacy levels, both of which can be addressed through appropriate computer use. These educational problems combined with lack of Internet connectivity have been addressed in the CASS program; participants made “unforgettable lessons” that each teacher carried back to their home country for offline use.

CASS is an intense training program that requires participants to move to the United States for an extended period. These participants endure separation from family, long hours of training and community service, and new cultural environments as tradeoffs for gains in knowledge and experience. The reward for these sacrifices is the enrichment that occurs in their personal and professional development. Findings from this study provide evidence of the potential for CASS participants to serve as change agents in their work communities. However, documentation of this concept requires further research.

Longitudinal studies are recommended to document the impact of participants on their communities to truly measure CASS program effectiveness. A study of CASS graduates could be conducted using email to inquire as to how they are utilizing what they learned in the program and to document perceived impacts within their schools and communities. Also, a continual flow of communication and follow-up could provide for continual support of the CASS graduates working in...
the field and also provide a significant amount of information for CASS instructors to prepare for future students in the program. Such documentation would build upon this study and could open doors to partnerships between governmental and international non-governmental organizations to implement similar ICT programs. Equipping teachers with ICT knowledge and resources has the potential to reduce the digital divide in Central America, especially concerning ICT gaps in rural and subsistence agricultural communities.

References


Curriculum Reforms and Competence Level of High School Agriculture Teachers in Swaziland

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Abstract
A descriptive study was designed to determine competence level of high school agriculture teachers regarding curriculum reforms in Swaziland. The major objective of the study was to compare the International General Certificate of Secondary Education (IGCSE) and Swaziland General Certificate of Secondary Education (SGCSE) agriculture syllabi using content analysis procedure in terms of objectives, content topics contained in the syllabi, learning approaches used, available teaching facilities and assessment used. In this study, information from content analysis revealed that the SGCSE agriculture syllabus was similar to the IGCSE agriculture syllabus in some aspect and dissimilar in other aspects. The findings indicated that the SGCSE agriculture curriculum had three more objectives, and had more content topics which were responsive to the socio-economic challenges of the country. The IGCSE and SGCSE agriculture curricular had similar teaching facilities and similar teaching and learning approaches as they are both student-centered and skill based. It can be concluded that the new objectives and new topic contents incorporated into the SGCSE agriculture syllabus has created a gap in terms of knowledge base possessed by the high school agriculture teachers in Swaziland. There is a need for agricultural topics to change to reflect changing conditions in the environment and advances in technology. This is to enable high school agriculture teachers enhance their competencies in addressing the new objectives incorporated in the SGCSE agriculture syllabus, as well as teaching the new content topics incorporated in the SGCSE agriculture syllabus.

Keywords: Competence, Content Analysis, Curriculum, High School Agriculture Teachers, IGCSE Agriculture, SGCSE Agriculture

Introduction
The Government of Swaziland recognises the importance of skills-oriented education in addressing the problem of unemployment. Agricultural development was viewed as one important part in addressing the problem of unemployment, given the nature of the geography and the economy of the country. Schools were singled out as key players responsible for bringing immediate and positive transformations. In order to fulfil this
mandate, David Gooday was tasked by the Education permanent Secretary to activate the formation of the Schools Agriculture Panel (Dlamini, 1986). The Schools Agriculture Panel is supposed to work hand-in-hand with the National Curriculum Centre in ensuring that an appropriate curriculum is in place and that adequate support in terms of teachers and equipment is provided to schools.

Agriculture teachers have a mandate to teach agriculture to the youth in schools in a formal setting because agriculture teachers possess technical agriculture and professional education (Dlamini, 2007). One of the aims of introducing agriculture in schools is to demonstrate the value of agriculture to the family and community so as to show how improved agriculture can contribute to the world-wide campaign for freedom from hunger. Another aim is to ensure that schools take an active part in rural development by the integration of agricultural activities into the school curriculum and development of a school farm, ensuring that students actively participate in farming events through the course (Magagula, 2005).

Since the inception of agriculture in schools, remarkable achievements have been made with regards to the attainment of the objectives of the programme (Dlamini, 1982; and Khoza, 1986). According to Sukati (2000), there has been proportional increase in the number of schools incorporating agriculture as a practical subject, and by 1998, there were 65 high schools, 96 secondary schools and 210 primary schools offering Agriculture curriculum. However, Dlamini (1990) noted inadequacies in the Ordinary Level Agriculture curriculum; its rigidity and non-flexibility in accommodation and the difficulty of injecting new relevant areas, which can assist school graduates to consider agriculture enterprises as an alternative to self-employment.

The Government of the Kingdom of Swaziland underscores the fact that, since the country is faced with socioeconomic challenges such as poverty, unemployment, HIV/AIDS, increased competition in Direct Foreign Investments and global competition in products and market conditions, educational reforms are inevitable. The curriculum offered should take into account the demands of the industry, informal sector and special target groups as well the emerging and potential economic sectors (Ministry of Education and Training, 2010). His Majesty described agriculture as the backbone of the country’s economy (The Ministry of Economic Planning and Development, 2006).

Agriculture being the backbone of the country’s economy, there is a need to consistently evaluate the agriculture curriculum offered in schools and align it with the current socioeconomic challenges. A needs assessment revealed the importance of crafting business management skills, entrepreneurial skills, and information technological skills, improving human relations, and transforming the current curriculum to fuse some vocational and technical aspects in order to adapt to the foregoing changes (Ministry of Education, 2009). A major transition in agriculture curriculum in Swaziland is currently underway. The country’s economic reforms have brought changes in traditional agriculture curriculum offered in schools. The Ministry of Education and Training have since moved from the O Level Agriculture curriculum to the International General Certificate of Secondary Education (IGCSE) Agriculture in 2007, then subsequently localized to the Swaziland General Certificate of Secondary Education (SGCSE) Agriculture in 2010 (Ministry of Education, 2009).
Borich (1980) defined a training need as "a discrepancy between an educational goal and trainee performance in relation to this goal." He further suggested that training programs could utilize his model by employing the two extreme positions: what are (the measured behaviours, skills, and competencies of trainees) and what should be (the goals of the training program). According to Borich, the discrepancy between these two positions can be used as an index to determine the effectiveness of training.

Curriculum changes are basically responsive to political and socio-economic challenges; therefore, new content information is likely to be crafted in the new curriculum. Such curriculum modification, in the modern era of technology, more often than not demands changes in pedagogy; hence, teacher competence is consistently challenged (Dlamini, 2004; Wallance, 1996; Ottevager, 2001; Taylor, 2000; and Bently, 1992). Indeed, the SGCSE agriculture syllabus came with new additional objectives and new topic contents. Since there were new additional objectives and new topic contents incorporated, the questions were (a) How are high school agriculture teachers coping with the implementation of the syllabus, in terms of knowledge base? and (b) What are the knowledge gaps, if any, and in which aspects of the teaching and learning of agriculture? There is a need to investigate teacher competence levels in teaching the SGCSE agriculture syllabus. Currently, there is no systematic documentation in Swaziland on professional competencies of the SGCSE agriculture teachers. Hence, a gap in the literature existed, and this investigation represented an important piece of research that contributed to the knowledge and needs of high school agriculture teachers in Swaziland.

According to Krippendorff (1989), content analysis is a research method that uses a set of procedures to make inferences from text. Content analysis therefore remains an ideal data collection procedure in this study, where the SGCSE and IGCSE agriculture syllabi can be compared objectively and systematically and have inferences drawn on similarities and differences in term of their objectives, content topics contained, teaching and learning approaches used, and assessment used.

The purpose of content analysis is to provide knowledge, insights, facts and a practical guide to actions (Krippendorff, 1989; Tesch, 1990; and Holsti, 1969). This suggests that inferences drawn from the two syllabi, with new additional objectives and new topic contents incorporated, can be used to develop insights on teacher competence and subsequently allow one to develop a practical guide to actions on identified in-service training needs of high school agriculture teachers in Swaziland.

**Purpose and Objectives**

The purpose of the study was to determine the competence level of high school agriculture teachers regarding curriculum reforms in the Swaziland high school agriculture curriculum. The objectives of the study were to:

1. Compare the IGCSE and the SGCSE agriculture syllabi using a content analysis procedure in terms of their objectives, topics contained in the syllabi, learning approaches used, teaching approaches used, available facilities, and assessment used.

2. Identify knowledge gaps of high school agriculture teachers on the new topic contents included in the SGCSE agriculture syllabus.
Methodology

The study design was descriptive, employing qualitative procedures. In this research design, data collection procedures involved content analysis of SGCSE and IGCSE syllabi. To collect data, a checklist was developed after extensive review of literature. Information from the two syllabi was compared to each other in terms of their objectives, content topics, learning approaches, teaching approaches, facilities, and student assessment, so as to identify the knowledge gaps. A summary of facts was drawn and then organized into similarities and differences, which enabled the researchers to give a careful and thorough description of the situation. A thorough analysis on the differences in terms of objectives and new topic contents offered by the two syllabi allowed one to determine gaps in terms of knowledge base, upon which insights on teacher competencies could be determined. Information obtained from content analysis was further analysed and presented in charts, tables, and figures.

To identify knowledge topic gaps of high school agriculture teachers on the new topic contents included in the SGCSE agriculture syllabus, content analysis comparisons of the SGCSE and IGCSE syllabi were conducted to identify differences and similarities of topics in the two syllabi to determine more and new topic contents incorporated into the SGCSE new agriculture syllabus.

Findings

Objective 1 of the study was to compare the SGCSE and IGCSE agriculture syllabi in terms of their objectives, content topics, teaching approaches, facilities, and assessment.

Content analysis of the objectives contained in the IGCSE and SGCSE agriculture syllabi

The results of the study indicated that the IGCSE and SGCSE agriculture syllabi were similar in terms of objectives. Information contained in Table 1 revealed that the IGCSE syllabus had ten objectives, while the SGCSE syllabus had 13 objectives. The two syllabi had ten similar objectives which relate to practical teaching, stimulating positive attitudes towards agriculture, providing basis for further training, demonstrating farming as a profitable business, encouraging self-reliance and resourcefulness, and creating an awareness of opportunities and challenges in agricultural development. The findings are in line with Sukati (2000), who called for integration of the modern agriculture and pre-vocational agriculture programs, since they had similar objectives. However, the observed differences in this study were that the SGCSE agriculture syllabus had three more objectives, which were addressing current socio-economic challenges such as millennium development goals, human rights, gender equity and environmental issues.

Content analysis by syllabus topics

The results of this study indicated that there was a difference in topics taught at the SGCSE and the IGCSE agriculture syllabi. Information contained in Figure 1 revealed a list of new topic contents incorporated in the SGCSE agriculture syllabus. The findings revealed that there were more and new topic contents incorporated in to the IGCSE new agriculture syllabus to respond to socio-economic challenges and technological changes. The findings of the study are consistent with findings from several studies (Mbingo, 2002; Mabusa, 2002; and Wallance et. al, 1996). These studies called for curriculum innovations and for the curricula to be responsive to socio-economic challenges. The new topic contents covered
in the SGCSE curriculum that were not offered by the IGCSE curriculum were: invasive plants, biotechnology and plant improvement, marketing, farm credit and agribusiness/entrepreneurship.

HIV/AIDS, national and regional policies, desertification, global warming, pollution, biotechnology and plant improvement, marketing, farm credit and agribusiness/entrepreneurship.

Table 1. The Objectives of the SGCSE and the IGCSE Agriculture Syllabi

<table>
<thead>
<tr>
<th>SGCSE</th>
<th>IGCSE</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate the value of agriculture to the family and community, and show how agriculture can contribute to the world-wide campaign for poverty alleviation and food security.</td>
<td>Demonstrate the value of agriculture to the family and community, and to show how improved agriculture can contribute to the world-wide campaign for freedom from hunger.</td>
<td>This objective was similar in both the SGCSE and IGCSE syllabi. It emphasized the contribution of agriculture in alleviating poverty and food security.</td>
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<tr>
<td>2. Develop scientific methods such as accuracy and precision, objectivity, integrity, enquiry and inventiveness.</td>
<td>Develop scientific attitudes such as accuracy and precision, objectivity, integrity, enquiry, initiative and inventiveness.</td>
<td>The objective was similar in both syllabi. It highlighted relying on scientific methods to solve problems.</td>
</tr>
<tr>
<td>3. Develop initiative and self-education so as to encourage resourcefulness and self-reliance.</td>
<td>Develop initiative, self-reliance, resourcefulness, problem-solving abilities, scientific methods and self-education.</td>
<td>The major objective was similar in both syllabi, and it encouraged students to be resourceful</td>
</tr>
<tr>
<td>4. Develop desirable values and attitudes towards the country’s natural resources for sustainable agricultural development.</td>
<td>Ensure that schools take an active part in rural development by the integration of agricultural activities into the school curriculum.</td>
<td>The objectives was similar in both syllabi and emphasized a need to wisely use natural resources for development while ensuring that future generations also benefit from them.</td>
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<td>5. Create awareness of existing problems so as to stimulate problem solving abilities.</td>
<td>Promote an appreciation of agriculture as an applied science.</td>
<td>In both syllabi, this objective emphasizes creating awareness, where students can appreciate agriculture and how it can be scientifically applied to solve existing problems.</td>
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<tr>
<td>6. Stimulate development of entrepreneurial skills necessary to initiate and manage business.</td>
<td>Encourage the teaching, in a practical manner, of basic principles and skills in agriculture, and of efficient farm management.</td>
<td>In both the syllabi, this objective encourages one to teach agriculture in a practical manner, such that students are motivated to start agricultural projects and encourage self-employment, since it is skill based.</td>
</tr>
<tr>
<td>7. Provide a background, together with basic sciences,</td>
<td>Provide an important element, together with the</td>
<td>In both syllabi, this objective encourages students to</td>
</tr>
<tr>
<td>8.</td>
<td>Ensure that the learning of agriculture integrates with development agencies.</td>
<td>Understand that agriculture is science and should be linked with mathematics for more advanced studies in agriculture.</td>
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<tr>
<td>9.</td>
<td>Encourage the development of an agriculture department farm or small holding, ensuring that learners actively participate in farming events.</td>
<td>Develop a school farm or a small-holding and ensure that students actively participate in farming the small-holding throughout the course.</td>
</tr>
<tr>
<td>10.</td>
<td>Encourage pupils to appreciate and have interest in agriculture because of its contribution to food security and poverty alleviation.</td>
<td>Stimulate positive attitudes by showing that farming can be both a beneficial and a rewarding occupation.</td>
</tr>
<tr>
<td>11.</td>
<td>Promote gender equity in the learning activities, by recognizing the realities of the roles played in agriculture.</td>
<td>X</td>
</tr>
<tr>
<td>12.</td>
<td>Harness indigenous knowledge and experiences so as to promote socio-cultural diversity.</td>
<td>X</td>
</tr>
<tr>
<td>13.</td>
<td>Promote awareness of the impact of HIV/AIDS on agricultural production.</td>
<td>X</td>
</tr>
</tbody>
</table>
Comparisons of the SGCSE and the IGCSE agriculture syllabi in terms of teaching and learning approaches

The findings of the study indicated that both the SGCSE and IGCSE agriculture syllabi foster “deep learning strategy,” and teaching is student-centred. Information contained in Figure 1 reveals that, in both syllabi, teaching is student-centered and students foster a deep learning strategy. Teachers teach outside the instructional paradigm and encourage the use of problem-solving, inquiry learning, cooperative learning, field visits, and use of resource persons.

**SGCSE Agriculture**

**IGCSE Agriculture**

*Figure 1.* Comparisons in the content topics and teaching and learning approaches in the SGCSE and IGCSE agriculture syllabi.

The results of the study are inconsistent with results obtained by Mbingo (2002). Mbingo (2002) suggested that teaching of agriculture should be practically oriented and competence based, use discovery learning, involve investigatory approach, be research based, problem-based, and seek to probe students about current problems and brainstorm on possible solutions to existing problems.

Comparisons of the SGCSE and the IGCSE agriculture syllabi in terms of facilities

The findings of the study indicated that both the SGCSE and IGCSE curricula require similar facilities and equipment (Figure 2). Since both the SGCSE and IGCSE are skill based, this requires facilities such as: books, videos, CD ROMs, charts, maps, instruments, solids, tools, trundle wheels, computers, access to internet, television, digital cameras, USB flash drives, audio cassette recorders, soil augers,
This study therefore acknowledges the work by Sukati (2000), where he concluded that the integration of modern agriculture and pre-vocational agriculture programme would improve the use of physical and personnel resources.

**Figure 2.** Teaching methods and facilities used in both SGCSE and IGCSE agriculture syllabi.
Comparisons of the SGCSE and the IGCSE agriculture syllabi in terms of assessment approaches

The findings of content analysis indicated that assessment in the two programmes was based on three papers. All the three papers are compulsory in the SGCSE agriculture. Two of the three papers, papers 1 and 2, were formal examinations. Paper 1 is weighted 30% of the final mark, while Paper 2 is weighted at 40% of the final mark. Paper 3 was basically a teacher-assessed continuous assessment of the candidate’s practical work. Assessment is on six practical exercises worth 30 marks and one investigatory project worth 30 marks. This paper is weighted 30% of the final mark. In the SGCSE curriculum, grades discriminated from A to G. Assessment on the IGCSE curriculum was also based on three papers. In contrary, only Paper 1, which weighed 25%, was compulsory; the candidates either register for Paper 2 (core curriculum), which weighs 45%, and have marks discriminating from C to G, or register for Paper 3 (extended curriculum), which also weighs 45%, and have grades discriminating from A to C. Continuous assessment for each candidate was either practical work or an investigatory project. Each candidate has one practical assessment, either Paper 4, based on six practical exercises, or Paper 5, a project work. Each paper weighs 30% of the final mark. Figure 3 present the findings on assessment on the two syllabi.

**Figure 3.** Comparisons in the assessment of the SGCSE and IGCSE agriculture syllabi.
Identified knowledge gaps in teaching the new topic contents included in the SGCSE agriculture syllabus

Objective 2 of the study was to identify knowledge gaps of high school agriculture teachers on the new topic contents included in the SGCSE agriculture syllabus. Information contained in Figure 4 reveals a list of in-service training needs for high school agriculture teachers. The findings of this study revealed that curriculum reforms incorporated new topic contents, addressing current socio-economic challenges; hence, inferences drawn from content analysis with regard to contents topics contained in the SGCSE and IGCSE agriculture syllabi revealed an insight that teachers had low competence levels on the new topics incorporated in the SGCSE agriculture syllabus and need in-service training on the following topics: HIV/AIDS, desertification, greenhouse effect/global warming, pollution, invasive plants, intermediate technology, budgeting, farm credit, and entrepreneurship.

Figure 4. Identified knowledge gaps of high school agriculture teachers in Swaziland.

Conclusions, Implications and Recommendations

The conclusion drawn from this study was that the SGCSE agriculture syllabus was similar to the IGCSE agriculture syllabus in some aspect and dissimilar in other aspects. The syllabi were similar in their objectives, teaching approach, and assessment. They were dissimilar in that the SGCSE agriculture syllabus had more objectives and new topic contents integrated to address advances in agricultural technology, current socio-economic challenges, as well as addressing issues related to global and environmental challenges. The study examined and ensured that agricultural education curricula can validate knowledge gaps between what is to be taught by teachers to meet national, regional, and international standards, and the need for the provision of in-service training.
on new curriculum topics to agricultural teachers.

The study revealed that there is a gap in terms of knowledge possessed by high school students and agriculture teachers and knowledge needed to successfully teach and learn the new topic contents incorporated in the SGCSE agriculture syllabus. Joerger (2002), Nzuza (1989), Mhlanga (1995), Mbingo (2002), and Mabusa (2002) reported agriculture teacher inadequacies regarding agricultural technology and agribusiness. This implies that for high school agriculture teachers to successfully implement the SGCSE agriculture curriculum, they need an urgent in-service training on the new topic contents. The study is adding new knowledge and making sure that teachers have the competency to deliver the new curriculum including the new topics, such as HIV/AIDS, desertification, greenhouse effect/global warming, pollution, invasive plants, intermediate technology, budgeting, farm credit, entrepreneurship, student-centred teaching strategies, information communication technology, and competency based assessment. The identification and recognition of the new topics to be included in the curriculum is appreciable in considering national, regional and global concerns. The study is adding new curriculum topics and indicating that teachers need in-service training for them to have the competency to deliver the new curriculum.

There is a need for agricultural topics to change to reflect changing conditions in the environment and advances in technology. This is to enable high school agriculture teachers to enhance their competencies in addressing the new objectives incorporated in the SGCSE agriculture syllabus, as well as teaching the new content topics incorporated in the SGCSE agriculture syllabus.

References


Using Reflective Journals to Gain Insight
Into an Agricultural Communications-Intensive Study Tour

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Abstract
The globalization of society continues through the expansion of information media channels and presents the need to prepare internationally experienced agriculture students. International study experiences impact students’ global perceptions and in turn shape public perceptions regarding the future of agriculture. The purpose of this study was to gain insight into intensive work experiences for agriculture students studying abroad. Students from four land-grant universities (N = 11) were selected to participate in a three-week intensive study tour in Ghent, Belgium. Students recorded their perceptions throughout the experience using reflective journals. A content analysis was conducted on the journal entries to identify thematic reflections related to personal and professional development. The qualitative data analysis revealed the personal and professional value students found in the international experiential learning opportunity. Students struggled the most when working with clients but found successfully completing projects to be rewarding. Students’ confidence levels steadily increased as they realized they could contribute to their teams and successfully serve a client in a professional setting. Host families were the most pressing concern for students but proved to be an impactful means of exposing students to Belgian culture. Students often sought normalcy by comparing the
European culture to America and built lasting relationships with classmates and host families through meals and outings. Earlier research recommended increasing students’ opportunities in global agriculture by placing students in international settings, and this study supports this finding and encourages international work-related experiences.

Keywords: Student Work Experience, Agricultural Communications, Experiential Learning, Study Tour, Reflective Journals

Introduction

A challenge currently facing American agriculture is the diminishing number of individuals directly involved in the field (Doerfert, 2011). According to Doerfert (2011), “…the future of American agriculture rests in the hands of 98% of the United States population who do not reside on a farm and may have little to no understanding of agriculture” (p. 11). The public relies on news media for information regarding scientific issues; however, journalists responsible for disseminating this information to the masses believe that individuals are uninformed and do not have a significant impact on funding and policy (Lundy, Ruth, Telg, & Irani, 2006). Because Americans lack understanding of the agriculture industry, it is essential that agricultural communicators make information accessible to the public to increase informed decision-making in agricultural topics (Doerfert, 2011). The industry is expanding and evolving not only in America but also throughout the world. It is important for agricultural communicators to be aware of these changes and their impact on trade, policy, perceptions, and production.

United States citizens must strive for global awareness (Nehrt, 1993). Agriculture has evolved and grown in complexity, while the world continues to shrink as communication improves. Nehrt (1993) noted that the United States has become involved in a global era and education is needed to prepare people for the responsibility of living in an interconnected world. Communication channels help agricultural communicators address both global awareness and public education. Not only can media channels be tailored to meet public learning preferences, digital media can also assist by providing instant coverage and feedback across countries (Raiz, 2011). As technology continues to eliminate communication barriers across nations, it is increasingly important for agricultural communicators to be globally experienced. Agricultural communicators are uniquely prepared to assist with communicating highly technical messages in food production and processing, animal and human health and nutrition, and the environment to multiple audiences through diverse mediums. However, collegiate training and educational opportunities fall short of preparing agricultural graduates to work in the global market, and U.S. employers spend millions of dollars on intercultural training to overcome this deficiency (Hunter, 2004).

Issues in globalization and cultural diversity have gained attention in higher education (Zhai & Scheer, 2004). For over a decade, research has reinforced the need to offer international agricultural experiences to students (Edgar & Edgar, 2009; Place, Irani, Friedel, & Lundy, 2004; Wingenbach, Boyd, & Lindner, 2003; Zhai & Scheer, 2004). The Association of Public and Land-Grant Universities (APLU) has urged land-grant university presidents to modify curricula to provide students with tools to not only “contribute to knowledge, but also to comprehend, analyze, and evaluate its meaning in context of an increasingly globalized world” (APLU, 2004, p. 2). Universities address this call by providing globally focused courses, travel courses, and study abroad opportunities.
(Gouldthorpe, Harder, Stedman, & Roberts, 2012). Place et al. (2004) discovered that although undergraduate and graduate students involved in agricultural sciences attending the University of Florida had little background in international settings, students were interested in travel and being engaged in international experiences. Agricultural communications students who study international agriculture policy, products, peoples, and culture may increase their understanding through these unique experiential learning opportunities.

**Theoretical/Conceptual/Operational Framework**

The goal of this study was to develop a basic understanding of the impact an experiential learning program had on a small sample’s attitudes and perceptions of an international experience. In 2011, broad research needs for agricultural education, agricultural communications, leadership education, extension education, and international agriculture were outlined in the *National Research Agenda: Agricultural Education and Communication 2011-2015*. This study responded to two specific research needs noted in the agenda. The first Research Priority Area (RPA), “Public and Policy Maker Understanding of Agriculture and Natural Resources,” urges researchers to increase the “...understanding of related message and curriculum development, delivery method preferences and effectiveness, and the extent of change in audience knowledge, attitudes, perceptions and behaviors after experiencing an educational program or consuming related information and messages” (Doerfert, 2011, p. 8). Additionally, this study considered the fourth RPA, which included creating and assessing “Meaningful, Engaged Learning in All Environments” (Doerfert, 2011, p. 9). RPA four notes the need for areas of scientific focus to “[e]xamine the role of diversity and multiple perspectives in meaningful learning across agricultural education contexts” (Doerfert, 2011, p. 9). According to Bruening, Lopez, McCormick, and Dominguez (2002), meaningful experiences are those that actively involve students in experiencing a person, surrounding, or situation. These meaningful learning opportunities are available to students through experiential learning opportunities. Experiential learning theory maintains that learning is consciously constructed and adapted through experiences over time (Kolb, 1984). While knowledge may be gained through passive learning, it is only through experiential learning that students can build skills most needed by those within the communications industry. These skills include meeting deadlines, conducting oneself ethically, dependability, verbal communication, and using grammar correctly – a broad skillset rather than one narrowly applicable to the communications field (Morgan, 2010). Students who participate in international experiences are introduced to a variety of ideas and practices that help shape the way they will work within the global era.

Subsequently, while the learner may fully experience a person, surrounding, or situation, the learner must take part in a reflection of that experience for it to take hold (Bruening et al., 2002). According to Thorpe (2004), reflective journals are an important tool in fostering active learning. Another study also stresses the importance of reflection activities throughout an experiential learning opportunity on the overall impact of a study tour. In their study of faculty international experiences, Gouldthorpe et al. (2012) recommended the use of pre-reflective exercises to identify preexisting biases or assumptions that may influence the learning process. Zhao (2003) defined reflective practice as the “ability to reflect on experiences, to employ conceptual frameworks, and to relate these to similar and dissimilar contexts to inform and improve future practice” (p. 2). Reflection allows the ability to analyze and create perceptions about experiences differently than one might have
done without reflection (Brockbank & McGill, 1998). Reflective exercises not only provided insight for trip coordinators but also allowed participants to identify expectations (Gouldthorpe et al., 2012). Because reflective activities, such as written journals, can be time-consuming for both students and instructors, it is recommended that faculty provide structured support and a designated time for journaling (Lamm, Cannon, Roberts, Irani, Snyder, Brendemuhl, & Rodriguez, 2011). This research study has the potential to help students obtain knowledge about international agricultural policy, practices, production, and products, thereby allowing them to be further prepared internationally and assisting them with enhanced out-of-country opportunities. The study also adds insight into intensive work experiences for students visiting another country by assessing agricultural communications students’ perceptions of an intensive study tour to Ghent, Belgium in summer 2012.

**Purpose and Objectives**

The purpose of this study was to add insight into intensive work experiences for students studying abroad. The study summarizes students’ journal entries with regard to perceptions of the intensive study tour experience in Ghent, Belgium in summer 2012. The objectives of this study were to (a) identify supporting themes exhibited by students in journal entries throughout the study tour and (b) assess students’ experience of the intensive study tour.

**Methods**

Agriculture students (N = 11) from the University of Arkansas, University of Florida, Auburn University, and New Mexico State University were selected to participate in a three-week intensive summer study tour in Ghent, Belgium. The goal of the study tour was to allow students to assist the Institute for Agricultural and Fisheries Research (ILVO), in conjunction with the University of Ghent (UG), to plan, organize, and evaluate an open house event for the organization. ILVO houses more than 500 researchers and technicians who provide insight to the Flanders government, which creates necessary policies that impact agriculture and the environment. Participants were selected through an application process that involved an application form and an essay expressing interest in the study tour. Applicants were then narrowed down by the project director based on student qualifications, and 11 students were selected in total.

During the intensive study tour, 10 undergraduate students and one graduate student worked directly with researchers to create short, consumer-friendly messages for a variety of media, including visual boards, posters, videos, social media, interactive activities, brochures, maps, and signage. Messages created by the students were used by ILVO to educate the Belgian public about agriculture at an open house event known as Open Enterprise scheduled for October 7, 2012. The focus of the special event was to help the general public better understand the science behind where and how their food is produced, processed, and marketed. Students were placed into four groups according to individual expertise and were assigned to a specific research discipline that would be highlighted during Open Enterprise: (1) animal science and fisheries; (2) plant science; (3) food pilot (nutrition, safety, and processing); and (4) social science. During the three-week study tour, students also toured food and animal production facilities in the country and participated in weekend trips to Ghent, Brugge, Paris, and London. Two of the eleven students remained in Belgium for a total of three months to complete unfinished projects and returned to Belgium in October to assist with Open Enterprise.

Before the intensive study tour, participants attended 10 weekly meetings with University of Arkansas faculty members. The
study tour course began February 21, 2012 and was completed at the end of the three-week experience in Belgium on June 7, 2012. At these meetings, students were provided with the skills and information needed to prepare for the international course and Belgian culture. Meetings included an introduction to course expectations, travel information, guest speakers, an overview of the Belgian culture, ILVO, and UG, and a discussion about Belgian agriculture and research. Faculty members also used meetings to help students gain or improve their agricultural communications skills in campaign planning, audience analysis, layout and design, video, and photography. Students were required to maintain a journal throughout the entirety of the experience and recorded their first entry at the first course meeting. Journals served as a portion of student grades. Participants were given the opportunity to journal Monday through Friday from 4:00 p.m. to 4:30 p.m. and were expected to journal at least once during the weekend. This, along with the course grade, motivated students to be accountable for recording daily entries.

During the intensive study tour, advisors maintained organizational stability by creating a formal schedule for students at the workplace. Each week, students were expected to work 37.5 hours weekly in their groups to complete projects for Open Enterprise. Two students acted as student group leaders, each of whom were responsible for overseeing and directing two of the four student groups. These student leaders had past experience in leadership positions and acted as a safety net for less experienced students. Both leaders remained in Ghent for a total of three weeks to finish any incomplete student work. Student groups worked from 8:30 a.m. to 4:30 p.m., Monday through Friday each week. From 8:30 a.m. to 9 a.m., all participants met as a single group to debrief. Each day at the debriefing session, students shared successes and struggles from the previous day at ILVO. After this session, students met with ILVO’s communications group for 30 minutes to ask questions and pose issues concerning group projects. Following the second meeting, students worked from 9:30 a.m. to 4 p.m. in their groups to complete their portion of creative pieces for their assigned research area. At this time, students were free to attend meetings that they had scheduled with researchers within their group’s assigned research area. Finally, at 4 p.m., students were given the opportunity to reflect in their journals for 30 minutes and then depart to their homestays for dinner.

Following the study tour, journal entries were transcribed and analyzed to identify emergent research themes related to the students’ personal and professional development. The reflective journal transcripts were loaded into NVIVO 9 software, which aided in open and axial coding of the content (Strauss & Corbin, 1998). Following Lincoln and Guba’s (1985) constant comparative method, passages were coded in their original context (Creswell, 1998), and key themes emerged that characterized the students’ perceptions related to their personal and professional development. Credibility of the findings was achieved through member checking and the use of the students’ own reflections (via their reflective journals). Trustworthiness and dependability were established through purposive sampling, the use of thick description, and the use of NVIVO 9 to establish an audit trail supporting the key findings.

Findings/Results

Nine key themes emerged from the journals ($N = 11$): (a) host family; (b) cooking, food, and beverage; (c) confidence; (d) seeking normalcy and comparing Belgium with the United States; (e) working with clients; (f) relationship building among students; (g) safety; (h) experienced students mentor less experienced; and (i) career decisions. These themes were addressed by each participant to
varying degrees in their daily journal entries. In the narrative below, students (respondents) are referred to as R1-R11.

Host Families
Since students lived with host families for the entirety of the intensive study tour, it was initially the most pressing concern for all participants. Before departure, students were optimistic about what homestays had to offer but were concerned and nervous about how they would fit in with their new family. Student nervousness stemmed from fear of rejection, being rejected by [their] host family, being “intrusive” (R2), sharing nothing in common with their host family, host family expectations, and living conditions.

This week during class we had someone come in and speak to us about homestays. She talked about her experiences staying with a host family and gave us some ideas about what to expect. After hearing her talk about homestays, I am less nervous and excited about the opportunity to learn about a new culture. (R1)

As students learned more about their host families and the experience, nerves subsided. While in Europe, relationships were strained for a few students and their host parents, but students adapted and seemed to make the most of the experience. Host families had a significant impact on exposing students to the Belgian culture. At the end of the study tour, students noted their host family as their favorite aspect of the experience and expected to maintain a relationship with their host families after returning to the United States. One participant noted during his final days in Belgium, “[My host father] has become a good friend. I have been wondering what I will miss most about Belgium, and I know that I will miss his friendship the most” (R3).

Cooking, Food, and Beverage
Sharing food and beverages with other students as well as with host families was noted often in student journals as an opportunity to bond and experience the Belgian culture. Students recorded differences in Belgian meals from their typical American ones and used these opportunities to reflect on their lifestyles and relationships with those around them. “Cooking with [host father] is fun and an educational experience. I try to keep an open mind about food so I try everything he suggests, and to my surprise, most of them are good” (R3). Bonding over meals with classmates and experiencing the culture was meaningful to students and often noted as being a “much needed” opportunity to relax between work hours. “We all had some drinks, and I do believe that was the best time I have had on the entire trip. The little moments like sitting at the café are the ones I crave” (R4).

Confidence
Students’ self-confidence levels increased steadily during the study tour. The experiences that contributed most to student confidence were related to successfully serving a client in a professional setting and realizing they could contribute to their teams. At the beginning of the study tour, students were insecure regarding their skills, ability to complete the study tour, role within their assigned work group, and role related to ILVO. In preparing for the study tour, one student noted,

I don't really feel like I have a good grip on what we’ll be asked to do by whom and for whom—and I feel like those things are things that I, as a student, will have to just figure out when I get there. (R5)
As students were assigned to groups and began work with ILVO, they slowly gained confidence, with highs and lows unique to each student.

I feel a lot better today about my input and the input of the other members of my group... I also felt a lot more useful today because I was able to be the note-keeper with my computer and keep everything in an organized manner that satisfied my type-A personality. (R6)

As students recognized that both their group and ILVO could benefit from their skills, they became more positive regarding their participation in the experience. Students were most appreciative and satisfied after successfully completing something they had never tried before.

Seeking Normalcy

In all aspects of the intensive study tour, students constantly sought normalcy and compared their experiences to home. Students struggled with homesickness and situations that they had never encountered, so they were comforted when they found similarities or constants. These comparisons also helped students gain a greater understanding of the world and a deeper appreciation for home. After visiting Paris on Memorial Day weekend, one student noted,

I have not decided yet if I want to go back [to Europe] or not. So much of what I saw was so beautiful and amazing, but I can’t decide if these things outweigh the filth and rude people. I am so glad I had an opportunity to go to Paris, but I am even more glad that I live in America! (R1)

Students noted similarities between Belgian and American agricultural practices and identified ways in which these practices could be improved on both ends.

Arriving at the layer farm was quite a bit of a shock. I have never seen such a clean poultry farm. The grass was cut and there was cement paving. The houses were solid walls with fans on the top. The grower seemed to be well-educated about the poultry business in Belgium as well as internationally. I found this to be quite a shock. (R3)

While students found Belgian poultry farms to be more modern and controlled than those in the United States, they also felt that other Belgian practices could be improved.

I found the Belgian Blue Cattle fascinating because I come from a beef cattle background. I really like the gait measurer and found it interesting that the Belgian people were so far behind in terms of spraying with GPS. (R7)

Working with Clients

Another theme identified in student journals was the challenge of working with clients. Working for clients was intimidating for all students and was the most difficult part of the program. Students struggled to communicate with clients and at times struggled to accept feedback without involving emotions. Not only did students have to learn to communicate with non-native English speaking clients in another country, but they
also had to learn how to work with researchers to translate complex research terminology into understandable and meaningful messages for the general public. One student reflected, “The researchers made it clear that they wanted to present their research without dumbing it too far down… It seems as though ego will be a big factor when dealing with researchers” (R6). Students were also apprehensive of sharing their work with the researchers due to fear of rejection and of prompting further revisions. Though the job was challenging, serving clients proved to be very satisfying for students. “It was nice to hear all the great things [the client] had to say about our work, because in the beginning it definitely felt like we were interlopers and the researchers weren’t incredibly excited about our presence” (R7).

**Relationship Building**

Journals also revealed that students bonded and built lasting relationships with each other. In spite of the fact that students attended four different U.S. universities, the intensive study tour presented an opportunity for students to grow closer as colleagues and friends.

I know that we are here to work, but I also feel that we are here for such a short time. I personally think that we should do more group activities together… I like to make friends, and the more time I spend with these people on this trip, the more I feel like I am making friends. (R3)

Although students built friendships, there were noticeable divisions among the students groups. One student explained,

I see that our group has its divisions. People quickly understand who they want to hang out with… It’s not that I don’t like the others; it’s just that these are the ones I seem to fit the best with. (R4)

Participants often recorded the desire to continue developing these friendships upon returning to the United States.

**Safety**

Safety was also a common theme in student journals. Not only were students in an unfamiliar country, but they were sometimes on their own as they navigated the cities where they visited and worked. Some students got lost at different points during the trip and reflected in their journals.

At one point we ended up getting on the wrong tram and had to backtrack our way home… It was a little scary not having our bearings or knowing where we were, but I think that’s all part of this trip—to be lost and find our way home. (R1)

Students especially showed concern for their safety upon witnessing pickpocketing and public intoxication on weekend trips. Despite being outside of their comfort zone, some students stepped up to ensure the safety of others on outings.

**Student Mentoring**

Just as students were protective of each other, students with more experience became student mentors. These students willingly accepted the responsibility of teaching classmates skills, such as using Adobe Creative Suite software and taking photos, to help classmates succeed in their communications tasks. Some students surrendered leadership positions to keep the peace within groups. One student reflected,
...I am stepping back and letting her take the lead, not as a coward, but because I know she has had more courses than I, and I could definitely learn things from her. I’m trying to not speak as much and just observe, process, and only if something is wrong, speak. (R8)

Students learned from each other and made adjustments to make sure that all projects were completed and prepared for ILVO by the end of the experience.

Career Decisions
Finally, a few students reflected deeply on their career paths as a result of their work experience during the intensive study tour. Students gained a greater understanding of their capabilities and limits, and some made decisions about the kind of work they do not want to do in their careers. One student reflected,

Sometimes I really wonder if I will ever make it in this industry. I just don’t know if I have it in me to work at a computer or be in meetings all day long. I love to write, but not like that. (R4)

Others found that they were able to survive an office-type, professional setting and discovered that they would be interested in pursuing a career in agricultural communications.

Summary: Program Success
Overall, students found the intensive study tour to be a success. All but three participants noted that he or she would like to participate in a similar experience again, but all found the program to be a meaningful one. A student who declined a second trip wrote, “I am proud of myself, and I am so glad I challenged myself to be a part of this. I would never do it again, but I am glad I did it” (R1). Beyond the challenge of leaving the country, others appreciated the tour for the skills that they acquired. “I’m glad that I am learning so much on this trip. It is like a class but accelerated and more practical” (R3). Finally, students valued the friendships that were made on the trip. “I realized today that the only thing that makes this trip (if not life in general) worth anything is the people. I love spending time with these people I have grown to love” (R4). Each student clearly gained something from the experience.

Conclusion and Recommendations
The findings of this study support conclusions and recommendations of previous studies urging educators to offer international agricultural experiences to students (Edgar & Edgar, 2009; Place et al., 2004; Wingenbach et al., 2003; Zhai & Scheer, 2004). Researchers have noted the importance of students participating in international experiences to increase their global perspective and gain cross-cultural competencies needed for a diverse and global workplace (Edgar & Edgar, 2009; Wingenbach et al., 2003; Zhai & Scheer, 2004). According to the student journal entries, all participants found the study tour to be meaningful. For many, this was their first internship experience as well as their first time traveling outside of the United States. Students found the experience offered a unique opportunity for them to gain practical skills quickly and work in a real-world setting. Study tours are beneficial in enhancing students’ understanding of the world and introducing them to multiple perspectives. Students played an active role in learning at ILVO as suggested by Bruening et al. (2002), creating a meaningful learning opportunity for themselves. Although students had prepped in their college classrooms for agricultural
careers, the international work experience helped students to see how the theory and skills they learned will be utilized in a work environment.

The nine themes that emerged from student reflections indicate important considerations related to international programs such as this one. Building relationships was especially important to students and was the root of their social concerns. Though students initially had anxieties regarding their host families, students noted their host family as their favorite aspect of the experience. Meals and weekend outings proved to be valuable in creating relationships with host families as well as strengthening relationships between classmates. These outings helped students build lasting friendships that each hoped to continue after the study tour was completed.

Opportunities to relax with host families and classmates were essential in maintaining morale at the workplace. Although students found homestays to be an enjoyable experience by the end of the study tour, it is recommended that future study tours encourage students to communicate via social media or video chat with host families early on to decrease concerns regarding incompatibility. Students in this study did contact host families through email, but other forms of communication or relationship-building activities may be more effective in making students comfortable with the living situation.

Additionally, students sought to build professional relationships. Having students work in groups allowed students to learn from each other’s strengths and solve problems as done in the workplace. Students at times became self-appointed leaders. This created power struggles among group members, especially those who were placed in leadership positions by advisors. Although conflicts did arise, group work taught students to overcome disagreements and to focus on completing the project. Working collaboratively and with a client from another country created an opportunity to present multiple perspectives to students and enhanced their understanding as encouraged by the fourth RPA of the National Research Agenda (Doerfert, 2011). Students gained skills from each other as fellow participants assisted in educating classmates to ensure that projects would be completed.

In many instances, the study tour pushed students outside of their comfort zone. Students sought normalcy in both the workplace and at home by comparing the Belgian and American cultures. To help overcome the unpredictability of visiting another country, advisors introduced formal schedules to create stability within the foreign environment. In hindsight, this preparation eased students’ transitions personally and professionally. Additionally, working for clients was intimidating for all students and was the most difficult part of the program. Although working with clients was challenging, it is recommended that students participate in international internships or intensive work-related study tour opportunities to prepare for careers in agriculture. Students struggled to accept feedback from clients because they were not yet comfortable with their own competence in design software and photography. These issues tested student confidence as participants sought their purpose within their group and at ILVO. Although it is encouraged that faculty and staff select students with existing skills needed to successfully complete the study tour, mastery of every skill in the discipline is not required. Students that lacked necessary skills adapted and picked up abilities along the way, which strengthened student confidence. An additional recommendation related to students’ comfort zone is to have in-depth, concrete discussions about emotional intelligence before departure to help students deal with criticism without damaging their confidence.

Finally, utilizing journal entries to gain insight into student perceptions proved not only valuable for the researchers but for the students
as well. Other researchers have noted the value of using journaling to strengthen, deepen, and enhance learning (Brockbank & McGill, 1998; Gouldthorpe et al., 2012; Zhao, 2003). Journal entries provided an outlet for students to record events and see the big picture as discussed by Brockbank and McGill (1998). Although students sometimes did think deeply about their personal growth throughout the study tour, their journal entries at times lacked in-depth reflection regarding their work with ILVO. Students worked an average of 37.5 hours per week but seemed more focused on the social aspect of the study tour in their journal entries. It is recommended that future study tours require daily journal entries but provide writing prompts to improve the quality and quantity of student reflections regarding the experiential work.

Though these findings cannot be generalized beyond the sample, they are useful in informing future study tours about possible benefits and limitations. The findings also prove the value of this particular experiential and international opportunity for students as requested in the first RPA (Doerfert, 2011). Furthermore, this study adds insight into conflicts and professional relationships that may arise in agricultural communications work environments. It is recommended that researchers study the impact of homestays or dorm living on student attitudes of an intensive study tour. Researchers should also test the use of personality assessments for participant placement into work groups and whether such a test is beneficial in creating a favorable work environment. Finally, researchers could benefit from contacting participants a year after the study tour to compare current student perceptions with those recorded immediately following the study tour. Remaining in contact with employed, past participants could also help researchers determine skills that should be taught to post-secondary students through experiential learning opportunities.

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Exploring Profitability of Compost Micro-Enterprises in Chimaltenango, Guatemala: A Case Study of Business Sustainability for International Development

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Abstract
The economic sustainability of innovations disseminated to rural communities is an important issue in agricultural development. However, individuals working in international development often do not fully employ monitoring systems to analyze the long-term profit of an innovation prior to diffusion. This multi-case study used qualitative methods, including individual/group interviews and observations, to gather data to analyze all necessary inputs of compost micro-enterprises in Chimaltenango, Guatemala. Each micro-enterprise’s relative output was examined to determine how agricultural extension efforts could modify its operations to produce profits. The results revealed entrepreneurs lacked an awareness of total inputs used/needed for a compost operation and lacked effective financial record keeping practices. Net profit fell when inexpensive unskilled labor was used, when the operation’s infrastructure deterred access to transport or deterred vision of the operation and when entrepreneurs used greater quantities of free raw material to produce equivalent amounts of compost. All micro-enterprises were cognizant of their compost ingredient ratios, but none had quantified total materials used to produce given amounts for specific periods. Findings from this study provide insights into factors that impact profitability related to compost micro-enterprises in developing countries.

Keywords: Compost, Micro-Enterprise, Sustainability, Profit, Inputs, Guatemala

Introduction
The majority of diffusion–adoption research has focused on the process of initial adoption or rejection of a particular innovation as opposed to long-term impact on livelihood (Miller & Mariola, 2009). Micro-entrepreneurship has been used by international organizations as an extension tool to provide alternative incomes for poor and economically vulnerable populations (Vargas, 2000). When a practice such as composting is used as a micro-enterprise’s main business undertaking, the financial success and longstanding use of that enterprise largely lie in accounting for various inputs needed for production.

Birks, Fluitman, Oudin, and Sinclair (1994) explained the complexity of micro-enterprise cost calculation. When an enterprise has failed to account for its inputs and consequent outputs, it becomes unsustainable because it has not satisfied present and future basic economic, social and security needs (Environmental Protection Agency, 2011). The capability of a micro-enterprise to obtain profit depends on the pivotal step of understanding its necessary inputs. As change agents, a discussion of these principles, especially with opinion leaders, may be effective as an innovation is diffused (Oleas, Dooley, Shinn, & Giusti, 2010). Accounting for these costs allows entrepreneurs to realize whether or not they possess sufficient funds to operate their enterprises.

Compost micro-enterprises are unique businesses because their final product’s formulas (Vukobratović, Lončarić, Vukobratović, Lončarić, & Ćivić, 2008), material quality and operational grounds (Zurbrugg, Drescher, Patel, & Sharatchandra, 2004) influence profitability. The ability to forecast costs and profits may assist international organizations in determining specific investments needed to initiate such projects and potential profits that such innovations could produce for communities.

Study Background
Sixty percent of Latin American rural households rely upon agriculture as their main source of income (Zezza, Carletto, Davis, Kostas, & Winters, 2008). Sadly, soil degradation “...is common in developing countries. A history of Mayan agricultural practices has led to ...rapid soil nutrient
depletion and declining crop yields” (Deevey et al., 1979, p. 298). It is estimated that up to 40% of Guatemala’s agricultural land has lost its productive capacity (O’Kane, 2006).

Major food crop yields have fallen in the past decade, including one of the region’s largest exports (i.e., sweet peas) (Eitzinger et al., 2011). A contributing factor to this decline was the green revolution’s heavy pesticide and fertilizer use; and furthermore users were not well informed of the consequences of their application at the time, and still today (Tetreault, 2012). Consequently, the concept or benefits of high soil bioactivity through the use of organic material like compost are minimally recognized (Klotz, 2012). Additionally, these benefits are overshadowed by the speedier productive results of synthetic fertilizer (Holt-Gimenez, 2006).

Compost is not a new idea brought to the region, but the concept of producing compost for sale, and marketing it as organic fertilizer, is a relatively new income stream brought to the Chimaltenango region several years ago by international development organizations (Maluccio, Melgar, Méndez, Murphy, & Yount, 2005). Education of the innovation’s practice and its business model were assisted through governmental, nongovernmental and agricultural extension entities (Klotz, 2012). Information about the innovation and its profitability were mainly diffused through female social networks (Oleas et al., 2010) and later by agricultural and political networks. These types of micro-enterprises were formed in rural villages by independent associations (e.g., occupational housewives) (Carletto, Kilic, & Kirk, 2011) as well as by coffee cooperatives (Angelina, Kiser, & Trevino, 2009). The enterprises received funding and technical assistance once officially established as a micro-enterprise, from governmental and international organizations, to improve their level of production (World Bank, 2008).

Hernandez and Torero (2011) explained that the fertilizer market of regions such as Chimaltenango is very dynamic because of the types of fertilizers sold and the types of farmers purchasing them. International synthetic producers of chemical fertilizers tend to dominate regional markets in Latin America, such as Chimaltenango, where competition is limited and prices are often inflated (Hernandez & Torero, 2011). Locals expressed to international development agencies that erosion caused by consecutive years of hurricanes warrants the application of fertilizers (Carr, 2008). Additionally, Carr (2008) stated the use of synthetic fertilizers is the preferred choice because benefits are promptly visible and primary nutrient composition (i.e., nitrogen, phosphorus, potassium) is denoted, unlike with compost.

Fertilizer is sold by the quintal, where a quintal is the equivalent to 45.45kg or 100lbs (Lewin, Giovannucci, & Varangis, 2004). The increase of prices has led farmers to use organic techniques (i.e., applying organic fertilizer) because of its low cost (Oleas et al., 2010). Synthetic fertilizers are sold in agro-depots, large and small, outnumbering the informal market and production of locally made organic fertilizer (Rios, Shively, & Masters, 2009). Compost, or, as it is called by the population, organic fertilizer, is either sold locally from its operational grounds or at local farmer markets. Compost produced from agro-byproducts made for retail purposes may come from cooperatives formed by small-scale farmers or large mechanized producers such as commercial sugar cane exporters (Rolz, Leon, Cifuentes, & Porres, 2010).

**Conceptual Framework**

The conceptual framework was based on the physical transformation of raw material to compost and the financial activities occurring during these operations. The literature revealed numerous physical and financial costs, obvious and unseen, faced by compost micro-enterprises. A number of
variables were identified as determinants for the economic sustainability of a compost micro-enterprise. Obvious variables included the social climate and agricultural support activities such as access to credit, favorable tenure systems, availability of markets, farmer resource centers and many more production factors that play a vital role in agricultural productivity (Nompozolo & Igodan, 2002, p. 331). Amounts of required raw materials for specific formulas are identified and input costs are then multiplied by quantities needed and finally summed in order to determine total costs spent per micro-enterprise. An integral part of determining an enterprise’s profit is to project output (Alam, Hossain, & Zaman, 2010).

**Labor and capital cost.** Labor costs and capital expenses for a compost micro-enterprise are critical for an entrepreneur to understand. “The level of capital costs required is dependent on the farming system and the climate” (O’Brien, O’Donovan, Gleeson, & Ruane, 2004). Haggblade, Gelson, and Tembo (2004) and O’Brien et al. (2004) explored returns on investment for various agricultural operations when using a large labor force. They found that while augmented manual labor increased output on smallholder agricultural operations, there is a financial threshold where profit begins to fall, regardless of the output made by a large labor force. Neither investigation analyzed small-scale agricultural operations when using laborers without farming experience or investigated how costs were mitigated by using machinery. Nevertheless, further studies were recommended to determine the costs of using manual labor, considering that rural enterprises often cannot afford technologies to replace labor.

**Operational cost.** Research has indicated that capital costs such as labor are heavily affected by the type of tasks conducted. Lapid, Ancheta, and Villareal (1996) organized compost production activities into three processes: sorting, composting, and refining. Labor and time spent to complete each specific task has been minimally explored among small-scale enterprises. Additionally, minimal analysis has been conducted on costs associated with each process, including fuel expenses dedicated to collecting and transporting raw materials to begin composting (i.e., sorting processes), machinery use costs (i.e., composting processes), and product packaging (i.e., refining processes). Accounting for these costs has great importance, especially if this type of entrepreneurship were to be established in areas that lacked sufficient infrastructure to facilitate transport to farmers’ markets (Flury & Guiser, 2002).

**Raw material cost.** The literature illuminated various types of raw material and how they were classified into different genres (e.g., green material, dry material) in order to formulate an appropriate mix to process compost. Vukobratović et al. (2008) conducted a cost-benefit analysis of various raw materials within a compost formula, noting the importance of using effective microorganisms (EMOs). They found that the duration of decomposition, compost quality, and cost-effectiveness of operations, regardless of material type used or the regimen administered, were affected by EMO presence. Raviv (2005) analyzed the quality of compost in terms of “…organic matter (OM) content, nutrient content, potential for disease suppressiveness and other physical, chemical, and biological properties…” when using specific quantities of raw materials (p. 52-53). His findings suggested that compost possessing favorable characteristics (e.g., air porosity, hydraulic conductivity) tends to be produced by raw materials rich in both carbon and nitrogen. Carbon is used as one source of energy to decompose OM. Nitrogen is used for building
cell structure. Decomposition requires a high enough carbon to nitrogen ratio (e.g., a favorable ratio is 30:1) to decompose OM; too much carbon can slow the decomposition process. A thorough examination of the physical or biological components of a micro-enterprise’s finished product is important when determining the relative advantage of the product; that is, the level of biotic activity within soil that influences crop yields after the application of compost (Raviv, 2005). Consumers’ views of compost’s relative advantage (Rogers, 1995) may influence sales. Before an evaluation can be conducted about compost’s effect upon soil productivity, the output of actual compost produced from a given amount of raw material should be determined. The measurement of specific amounts of output produced from specific amounts of input can enable the determination of the financial efficacy of different compost formulas.

Methods
Case study research was used in this study to identify and quantify variables of input and calculate their resulting output. “The purpose of a case report is not to represent the world, but to represent the case” (Stake, 2005, p. 460). Numerical data was collected via structured oral interviews, individually and in groups, to gather the total cost and amounts of inputs used to produce a reported amount of compost. These costs were monitored within a single six-week period to allow the necessary time for decomposition to occur and to observe all processes conducted. The costs included types and amounts of raw material (i.e., green, dry, manure) and capital (i.e., labor, transport, energy, and packaging) used to produce compost. The group interview protocol was developed from the literature to account for all potential costs that could have incurred during a micro-enterprise’s operations.

Individuals and their micro-enterprises included in the case were identified by the Agriculture in Guatemala: Technology, Education, and Commercialization (AGTEC) program, funded by a United States Department of Agriculture grant. Selected participants ($N = 24$) were identified and interviewed because of their continuous participation in each respective micro-enterprise. Among these 24 participants, some held higher position than the general laborer, such as president (three individuals), secretary (two individuals) and treasurer (three individuals). The entrepreneurs holding these positions were critical to interview to collect information about their micro-enterprise’s revenue and inventory records. A purposive sample consisting of three micro-enterprises was identified based on the enterprises’ participation and funding with AGTEC. Information about laborer positions and operations were collected. Micro-enterprises were randomly assigned a letter: Micro-enterprise A (10 entrepreneurs), Micro-enterprise B (9 entrepreneurs), and Micro-enterprise C (6 entrepreneurs). The principal investigator assigned a random number to each enterprise respondent to ensure confidentiality.

The principal researcher acted as interviewer, gathering information about the enterprises’ operations. Data collection occurred during July 2011. Prior to the collection period, instruments were composed by the researcher and translated into Spanish by the Executive Secretary for Trinidad’s designated Consulate for Panama. Data were gathered in Spanish and translated into English by the researcher. The principal researcher was an intermediate Spanish speaker and was accompanied by native speakers from the AGTEC staff to ensure reliability of translation.

Data were collected through structured oral interviews separately among each enterprise. All 24 participants were interviewed separately in their respective enterprise (Micro-enterprise A: 10 participants, Micro-enterprise B: 9 participants, Micro-enterprise C: 6
participants). These interviews were directed by a set of 13 questions. First, information was collected about the types, quantities, and prices of raw materials used in a six-week cycle (e.g., amounts of manure used). Second, total capital for infrastructure (i.e., building the operational grounds) and overhead (i.e., days of labor, transport cost, energy costs, and packaging costs) required to process raw materials was recorded in one six-week cycle.

Interviews sought to determine the unit of cost for each input. For example, payment of labor was distinguished between payment by the hour, task assigned, or by the day. Interviews additionally sought how inputs were affected by variables that did not assume financial overhead. For instance, inquiry was made regarding how transport and sales were affected by visibility and location of operational grounds. Interviews additionally sought to confirm the Output (in quintals) produced by an enterprise following a six-week cycle. Apart from interviews, visual representation of production observed during the researcher’s six-week study in Chimaltenango reconfirmed verbal responses of the each enterprise’s output.

From these interviews, Total Variable Cost, Total Revenue and Gross Margin were calculated. First, by summing the quantity of each input used in a six-week cycle, then multiplying it by the price, and finally summing the totals for each input, Total Variable Cost was determined. Total Revenue was calculated by summing the quintals of compost an enterprise produced after one six-week period and multiplying the total by price sold per quintal. Finally, Gross Margin was calculated by subtracting Total Variable Cost from Total Revenue.

As a final note, all costs were recorded in Guatemalan currency (i.e., Quetzals) during field research. According to SICE Foreign Trade System, an organization of the United States, the 2012 exchange rate was 1 US dollar (USD) to 7.79 Quetzals (Q) (The World Bank, 2012); thus, the findings were presented at this rate of US currency in the tables listed in the findings.

Three composting sites (one for each enterprise) and each of their methods of production were observed for six weeks. Construction receipts provided by the AGTEC program were reviewed to record funds allocated to micro-enterprises for erecting structures, application of microorganisms, and tools/machinery to conduct operations. After data collection, revenue was calculated to determine if economic sustainability was present in the compost micro-enterprises.

Reliability and validity of this study were monitored through member checking, peer reviews, and prolonged engagement in data collection. Reconfirming information with all respondents during in-group interviews, through observations during repeated visits, and in reviewing similar categories within the researcher’s documents was completed among all micro-enterprises to ensure triangulation. Raw data of amounts, interpretation of measurements, and categories of compost materials were discussed with respected colleagues to confirm legitimacy.

**Purpose and Objectives**

The purpose of this case study was to analyze inputs and outputs and determine profitability of compost micro-enterprises in Chimaltenango, Guatemala. Specific objectives were:

1. Identify all types of inputs associated with a compost micro-enterprise and quantify their amounts and costs by summing the amount of compost produced by that enterprise over a six-week production cycle;
2. Calculate amounts of raw materials required to produce one quintal (100 lb. sack) of compost from a micro-enterprise,
3. Evaluate the economic sustainability of micro-enterprises in terms of production costs and outputs.
Findings

The costs presented by each enterprise included types and amounts of raw materials (i.e., green material, dry material, or manure) and capital (i.e., labor, transport, energy, and packaging). These costs were monitored during a single six-week period to allow for necessary time for raw materials to decompose and be processed into the final product of organic fertilizer to be sold. Typically, employees were not aware of the total amount of inputs used and their total costs after six weeks. However, each micro-enterprise was extremely cognizant of the ratio between types of raw material it needed to make compost. Additionally, each was aware of capital it used and its costs during one six-week process but was unaware of how the sum of these operational costs factored into the total overhead cost. Furthermore, each micro-enterprise had an employee who recorded the quantity and cost of inputs used weekly, for example raw material costs (i.e., price of manure, green material, and dry material). Each micro-enterprise had its own regimented formula to make compost; yet, the total raw material used in one six-week cycle was not readily known. The principal researcher deduced the amount of the total raw material used in one six-week cycle by interviewing the secretary and reviewing his or her records of purchases made for raw material over several six-week cycles. Table 1 illustrates Total Variable Costs, Total Revenue and Gross Margin for each micro-enterprise. Raw material cost was a primary component of the Total Variable Costs.

Table 1. Gross Margin of Compost Micro-Enterprises A, B, and C

<table>
<thead>
<tr>
<th>Micro-Enterprise</th>
<th>Total Variable Cost(a)</th>
<th>Total Revenue</th>
<th>Gross Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>186.28</td>
<td>173.30</td>
<td>-12.98</td>
</tr>
<tr>
<td>B</td>
<td>381.71</td>
<td>86.70</td>
<td>-295.01</td>
</tr>
<tr>
<td>C</td>
<td>269.96</td>
<td>924.26</td>
<td>654.30</td>
</tr>
</tbody>
</table>

\(a\)Total Variable Cost, Total Revenue, and Gross Margin were originally measured in Quetzals (Guatemalan local currency) and then converted to US dollars.

All micro-enterprises sold their compost directly to customers from the premises of their operations; Enterprise A additionally sold its product in a local farmer’s market, requiring local taxis to transport the compost. Thus, the transport cost was included in the Total Variable Cost for Enterprise A. A micro-enterprise’s location and security fencing was found to affect how consumers could visibly see operations and inquire about purchasing compost. While the element of operation-visibility is not a financial variable, it should be noted that this element affected sales and energy costs to transport compost to farmer’s markets for selling. Each micro-enterprise used a Penagos Model TP-24 Grinder to chop raw material during operations. The grinder was powered by standard unleaded gasoline. More fuel was used depending upon type and amount of raw material used. This cost was included in the Total Variable Cost for each enterprise. All micro-enterprises used coffee or fertilizer bags possessing the carrying capacity of one quintal. Depending on the enterprise output, cost of packaging was calculated by the number sacks purchased to bag their final product and this was included in the Total Variable Cost for each enterprise.

The final cost included in the Total Variable Cost was labor. Production schedules were articulated as four tasks: grinding raw material, mixing raw material, aerating piles, and sifting and packaging compost. Each of these tasks required a unique combination of inputs in relation to labor. Characteristics, including the number of employees used, number of days to complete, and the amount of
inputs used (e.g., fuel) were recorded for each task. The speed at which a task was completed and the numbers of laborers demanded to complete a task presented a picture of the quality of labor used by each micro-enterprise. Table 1 reveals that Enterprise B incurred the highest Total Variable Cost by assuming the greatest amount of labor while at the same time producing the least amount of compost.

Table 2 presents the individual cost to produce a single quintal of compost for each micro-enterprise (i.e., Expenditure per Quintal). In this table, the Total Variable Cost was divided by Outputs to give a clear representation of how financially aware an enterprise was of its total expenditure used over a six-week period and if the price at which they sold their compost covered that expenditure. Hypothetically, if micro-enterprises were to sell their entire output of compost by the price listed under Expenditure per Quintal, the revenue made from sales would cover all overhead costs. For example, if Enterprise A were to price each quintal of compost for $6.21US, all input costs would be covered, but no profit would be made.

Table 2. Compost Micro-Enterprises A, B, and C: Total Expenditure to Produce One Quintal of Compost

<table>
<thead>
<tr>
<th>Micro-Enterprise</th>
<th>Total Variable Cost</th>
<th>Output</th>
<th>Expenditure per Quintal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>186.28</td>
<td>30.00</td>
<td>6.21</td>
</tr>
<tr>
<td>B</td>
<td>381.71</td>
<td>15.00</td>
<td>25.45</td>
</tr>
<tr>
<td>C</td>
<td>269.96</td>
<td>180.00</td>
<td>1.50</td>
</tr>
</tbody>
</table>

Total Variable Cost and Expenditure per Quintal are figures in US dollars.

Output is in figures of Quintals (100lb sacks)

Note: All data were estimated. Numbers should not be treated as exact figures.

Table 3 reports the Price Sold Per Quintal by an enterprise subtracted by the Total Variable Cost To Produce One Quintal to display the net profit for each sale of one quintal of compost (Gross Margin To Produce One Quintal). Two enterprises did not obtain a net profit (as seen in Table 3) due to selling compost for less than it cost to produce. It should be noted that when revenue from compost sales were received by Enterprise A and B, the entire amount was dedicated to purchasing raw material, fuel, transport and/or packaging. Employees were promised payment of salaries once profits were made; yet, Table 3 illustrates a negative Gross Margin was returned due to high input costs.

Table 3. Gross Margin Received by Micro-Enterprises A, B, and C per Quintal of Compost Sold

<table>
<thead>
<tr>
<th>Micro-Enterprise</th>
<th>Price Sold Per Quintal</th>
<th>Total Variable Cost To Produce One Quintal</th>
<th>Gross Margin To Produce One Quintal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5.78</td>
<td>6.21</td>
<td>-0.43</td>
</tr>
<tr>
<td>B</td>
<td>5.78</td>
<td>25.45</td>
<td>-19.67</td>
</tr>
<tr>
<td>C</td>
<td>5.13</td>
<td>1.50</td>
<td>3.63</td>
</tr>
</tbody>
</table>

1 Quintal is equal to a 100lb sack; Figures are in US dollars.

Note: All data were estimated. Numbers should not be treated as exact figures.
Table 4 illustrates the amount of raw material used by each micro-enterprise over one six-week cycle and the amount of resulting compost produced. In this table, Total Input was divided by Output to elucidate how far an enterprise’s recipe of raw material exceeded one quintal of compost. Enterprise C made the most profit, as seen in Table 3, but used the largest amount of raw material to produce one quintal of compost. As explained in Table 2, each Total Variable Cost included expenditures spent on labor, energy, packaging and raw material; thus, larger amounts of raw material incurred higher operation expenses.

Table 4. Amount of Raw Material used by Micro-Enterprise A, B, and C to Produce One Quintal of Compost: An Illustration of Conversion Efficiency

<table>
<thead>
<tr>
<th>Micro-Enterprise</th>
<th>Total Input&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Output Produced After One Six-Week Cycle&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Amount of Raw Material to Produce One Quintal of Compost&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>38.33</td>
<td>30.00</td>
<td>1.28</td>
</tr>
<tr>
<td>B</td>
<td>18.50</td>
<td>15.00</td>
<td>1.23</td>
</tr>
<tr>
<td>C</td>
<td>288.00</td>
<td>180.00</td>
<td>1.60</td>
</tr>
</tbody>
</table>

<sup>a</sup>Total Input, Output and Physical Cost To Produce One Quintal of Compost are figures of Quintals (100lb sack)

Note: All data were estimated. Numbers should not be treated as exact figures.

**Conclusions**

Based on findings, it was concluded that the construction of a micro-enterprise’s operational grounds incurred the greatest cost, and was the most limiting factor for profit. The size and location of operations will inevitably influence all variables. Literature revealed that an enterprise’s agroecological location would significantly affect its employee’s access to abundant material (Sseguya, Semana, & Bekunda, 1999). Findings from this case study indicated geographic location and its surrounding infrastructure affected access to farming consumers and markets. The physical boundaries where compost is produced will ultimately affect the amount of raw material and working space available to process it. While fencing is necessary for security, if a micro-enterprise’s operational unit was constructed in such a way that composting activities were not visible, direct consumers (e.g., farmers) within the enterprise’s community inquired less about the product and its price. Enterprise B and C both had open and visible operations resulting in their entire compost being sold at their site of production. Enterprise A, conversely, had walls enclosing its entire property, deterring visibility of operations. Enterprise A was forced to vend its entire compost and explain its comparative advantage at a market. Thus, it was concluded that sales were impacted greatly by operation visibility.

**Implications and Recommendations**

Training programs for composting micro-enterprise development should include instruction on effective composting practices and measurement of inputs, outputs, quality of compost, and overall good business practices. This study complimented Lapid’s et al. (1996) findings in which accounting for all expenditures during the production process was critical. Although, findings from the study revealed that when an enterprise used inexpensive and unskilled labor this in fact compromised the composting process by increasing the amount of time on each task and decreasing the amount of raw material processed. Individuals working in extension and international development should engage
adopters in discussions about the consequences of each investment. These types of discussions reiterate Flury and Guiser’s (2002) argument that small agro-business should avoid segregating funds to transport products to and from a market without assurance of sales (i.e., Micro-enterprise A) as opposed to creating a market where processing occurs.

Initial costs, especially construction, to establish a compost micro-enterprise should be outlined by those working in international extensions in an understandable format for future entrepreneurs. The pinnacle step of realizing where (e.g., near raw materials, well established infrastructure) and how (i.e., visible or hidden to farming consumers) this operational unit is built can encourage employee awareness of financial variables when managing a compost micro-enterprise. Extension personnel should explain how total variable costs and total revenue can be affected by consumer accessibility. Also, investment decisions should be discussed to determine how they may impact profitability. Use of the most inexpensive raw materials that yield the largest output without jeopardizing the quality of the final product is crucial. Material availability and price will vary depending on the region where a compost micro-enterprise is located. In addition, labor, time and energy costs (e.g., fuel) should be considered before purchasing or spending capital on collecting large amounts of raw material. Each raw material weighs differently, decomposes at different rates, and requires capital to process into compost. This was of particular importance when observing Enterprise C. While the enterprise received the highest gross margin among its counterparts, it consumed the greatest amount of raw material to produce one quintal of compost. These variables should be evaluated prior to the practice of composting.

Efficient agri-business practices by new adopters must not be solely evaluated by output (e.g., the number of bags of compost produced), but also by their ability to continue without outside financial support. Agricultural extension educators who direct newly initiated compost micro-enterprises must not only be capable of instructing the actual practice of composting, but also develop competencies to evaluate financial aspects of these types of businesses. It is critical that adopters be educated in determining the short and long-term profitability of their operations.

Additional areas should be explored within this field, including efficient labor use, raw material formulas that provide ample output and high-quality compost, and other economic aspects that contribute to financial success. If the profitable outcome of an enterprise’s practice cannot be predicted by its entrepreneur, its financial outcome may not only be jeopardized, but the economic livelihood of the community it employs.

References


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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://jiaeex.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.

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