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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.**

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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*.

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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*. Commentary articles are reviewed by two members of the Editorial Board for appropriateness, readability, and relevance to the *JIAEE*.

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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. Tools of the Profession articles are reviewed by two members of the Editorial Board for appropriateness, readability, and relevance to the *JIAEE*.

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<th>U.S./Canada Representatives</th>
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<tbody>
<tr>
<td>Gary J. Wingenbach, Editor</td>
<td>Maria Navarro, Associate Editor (Spanish)</td>
</tr>
<tr>
<td>Department of Agricultural Education</td>
<td>105 Four Towers</td>
</tr>
<tr>
<td>2116 TAMU, 218 Scoates Hall</td>
<td>The University of Georgia</td>
</tr>
<tr>
<td>College Station, TX 77843-2116</td>
<td>Athens, GA 30602-4355</td>
</tr>
<tr>
<td>Ph. 979-862-1507</td>
<td><a href="mailto:mnavarro@uga.edu">mnavarro@uga.edu</a></td>
</tr>
<tr>
<td>Fax 979-845-6292</td>
<td></td>
</tr>
<tr>
<td><a href="mailto:g-wingenbach@tamu.edu">g-wingenbach@tamu.edu</a></td>
<td>Mohamed M. Yacoub, Associate Editor (French)</td>
</tr>
<tr>
<td></td>
<td>Higher Institute for Agricultural Cooperation</td>
</tr>
<tr>
<td>Nick T. Place, Associate Editor (Commentary)</td>
<td>P.O. Box 198 Hadayek Shoubra</td>
</tr>
<tr>
<td>Associate Dean and Associate Director</td>
<td>Cairo, Egypt</td>
</tr>
<tr>
<td>University of Maryland Cooperative Extension</td>
<td><a href="mailto:mmyacoub@yahoo.com">mmyacoub@yahoo.com</a></td>
</tr>
<tr>
<td>1202 Symons Hall</td>
<td>Randall J. Andreasen, Ph.D.</td>
</tr>
<tr>
<td>College Park, MD 20742</td>
<td>4986 Gem Street</td>
</tr>
<tr>
<td>Ph. 301-405-2907</td>
<td>Las Cruces, NM 88012-9452</td>
</tr>
<tr>
<td>Fax 301-405-2963</td>
<td><a href="mailto:randaroo2@hotmail.com">randaroo2@hotmail.com</a></td>
</tr>
<tr>
<td><a href="mailto:nplace@umd.edu">nplace@umd.edu</a></td>
<td></td>
</tr>
<tr>
<td>James R. Lindner, Associate Editor (Tools)</td>
<td>Adewale Johnson Alonge, Ph.D.</td>
</tr>
<tr>
<td>Department of Agricultural Education</td>
<td>Miami-Dade Public School System</td>
</tr>
<tr>
<td>Texas A&amp;M University</td>
<td>9034 SW 163 Terrace</td>
</tr>
<tr>
<td>2116 TAMU, 228C Scoates Hall</td>
<td>Miami, FL 33157</td>
</tr>
<tr>
<td>College Station, TX 77843-2116</td>
<td><a href="mailto:alongeaj@yahoo.com">alongeaj@yahoo.com</a></td>
</tr>
<tr>
<td>Ph. 979-458-2701</td>
<td>Jerry D. Gibson, Associate Professor</td>
</tr>
<tr>
<td>Fax 979-845-6292</td>
<td>Virginia Tech University</td>
</tr>
<tr>
<td><a href="mailto:j-lindner@tamu.edu">j-lindner@tamu.edu</a></td>
<td>230 Smyth Hall</td>
</tr>
<tr>
<td></td>
<td>Blacksburg, VA 24061</td>
</tr>
<tr>
<td>M. Craig Edwards, Associate Editor (Book Review)</td>
<td>Edna L. McBreen, Associate Vice Chancellor</td>
</tr>
<tr>
<td>Oklahoma State University</td>
<td>Rowland Government Center</td>
</tr>
<tr>
<td>456 Agricultural Hall</td>
<td>55 West Main Street, Suite 500</td>
</tr>
<tr>
<td>Stillwater, OK 74078-6031</td>
<td>Waterbury, CT 06702</td>
</tr>
<tr>
<td>Ph. 405-744-8141</td>
<td>edna.mcbr <a href="mailto:een@uconn.edu">een@uconn.edu</a></td>
</tr>
<tr>
<td>Fax 405-744-5176</td>
<td></td>
</tr>
<tr>
<td><a href="mailto:edwarne@okstate.edu">edwarne@okstate.edu</a></td>
<td></td>
</tr>
<tr>
<td>James J. Connors, Past Editor</td>
<td>John R. Vreyens, President</td>
</tr>
<tr>
<td>Dept. of Human &amp; Comm. Res. Development</td>
<td>International Programs and MAST International</td>
</tr>
<tr>
<td>The Ohio State University</td>
<td>University of Minnesota</td>
</tr>
<tr>
<td>216 Agricultural Administration Building</td>
<td>135 Skok Hall</td>
</tr>
<tr>
<td>2120 Fyffe Road</td>
<td>St. Paul, MN 55108</td>
</tr>
<tr>
<td>Columbus, OH 43210-1067</td>
<td><a href="mailto:vreyens@umn.edu">vreyens@umn.edu</a></td>
</tr>
<tr>
<td><a href="mailto:connors.49@osu.edu">connors.49@osu.edu</a></td>
<td></td>
</tr>
</tbody>
</table>
World Region Representatives

David Wissink, Manager  
External Affairs & Sustainable Development  
Highlands Kainantu Limited  
Private Mail Bag, Lae, Morobe Province 411  
Papua New Guinea  
dwissink@HighlandsPacific.com  

Anibal Quispe, Ph.D.  
Agricultural Education and Extension  
Km.35.5 Carretera México-Texcoco, Montecillo  
Texcoco 56230  
México  
anibalq@colpos.colpos.mx  

Paul Schuetz, Ph.D.  
Agricultural Economics  
Dag_Hammerskjold-Weg 1-5  
Eschborn 65760  
Germany  
paul.schuetz@gtz.de  

Raymond Auerbach, Director  
Rainman Landcare Foundation  
Peacevale Road  
Hillcrest  
KwaZulu-Natal 3650  
South Africa  
auerbach@iafrica.com  

Prof Artur Cristóvão  
UTAD, Economics and Sociology Department  
Av Almeida Lucena 1  
5000-611 Vila Real  
Portugal  
acristov@utad.pt  

Eduardo Delgado, Ph.D.  
Instituto Nacional de Investigaciones Agrícolas  
INIA-Barinas  
Barinas 5201, apartado postal 178  
Venezuela  
duqueedu@yahoo.com  

AIAEE 2007-2008 OFFICERS

John R. Vreyens, President  
International Programs and MAST International  
University of Minnesota  
135 Skok Hall  
St. Paul, MN 55108  

Michael Angstreich, Secretary  
Senior Advisor for Development Cooperation  
Bioforsk - The Norwegian Institute for  
Agricultural and Environmental Research  
Høgskoleveien 7  
1432 Ås, Norway  

Pete Vergot III, President-Elect  
University of Florida IFAS Extension  
155 Research Road  
Quincy, FL 32351  

Thomas H. Bruening, Treasurer  
The Pennsylvania State University  
Dept. of Agricultural and Extension Education  
323 Agricultural Administration Building  
University Park, PA 16802-2601  

Nick T. Place, Past President  
Associate Dean and Associate Director  
University of Maryland Cooperative Extension  
1202 Symons Hall  
College Park, MD 20742  

Dr. Dermot J. Ruane, Board Member-at-Large  
UCD School of Agriculture, Food Science and  
Veterinary Medicine  
College of Life Sciences  
UCD Agri. and Food Science Centre #G19  
University College Dublin  
Belfield  
Dublin 4  
Ireland  

LaJoy Spears, Graduate Student Rep  
Iowa State University  
Department of Agricultural Education & Studies  
223 Curtiss Hall  
Ames, Iowa 50014  

Fall 2007  


From the Editor

Welcome to the *Journal of International Agricultural and Extension Education (JIAEE)*. And then there were none. With apologies to Agatha Christie, this issue marks the last of my six-year service as Editor of the *JIAEE*. I have enjoyed this journey. True to the oft-used adage from my Peace Corps Volunteer days in the mid-1980s, “you’ll learn so much more than you can teach here in Guatemala,” I have learned so much more than I could have taught during these past six years. One example of my learning is found in the excellent addition to our *Seminal Article Series* (pp. 5-15) authored by Dr. Barbara Ludwig; please take time to read her article, and then make a commitment to make your own changes in 2008 and beyond.

Producing great scholarship requires everyone’s efforts in improving the quality of manuscripts submitted for review, and the rigor with which those manuscripts are reviewed. The *JIAEE* had an acceptance rate of 50% in 2002 (my first year as editor) and has improved to 25.4% in 2006; currently, it is at 18% for 2007. The six-year average acceptance rate has remained steady at 33% for more than 340 manuscripts reviewed since 2002. While it may be interesting to reminisce about other changes in the *JIAEE* over the past six years, I would rather look ahead to a promising future.

The *JIAEE* editorship is being transferred into the capable hands of Drs. James Lindner and Kim Dooley (see page 111 for contact information), faculty members at Texas A&M University. On a positive note, their offices are close to mine, meaning their learning curve may be much flatter than mine when I became editor in 2002. On a negative note, their offices are close to mine. Seriously, I think the close proximity between outgoing and incoming editors is beneficial for the *JIAEE*. Already, we have collaborated on decisions about incoming manuscripts for peer review. Historical databases, letters, past reviews, publishing materials and contacts can be easily shared between offices. Another benefit comes from our continued use of the online manuscript submission and peer review process through Manuscript FastTrack®.

I would be remiss if I didn’t take this opportunity to thank several individuals for their guidance and assistance during my tenure as *JIAEE* editor. Dr. John Richardson, thank you for convincing me that I was capable of providing this service. Dr. Nick Place, thanks for convincing me that after the original first three-year term, I could further improve the *JIAEE* with a sustained effort in a second three-year term. Other inspirational mentors who made this journey a pleasant experience include Drs. Jack Elliot, David Acker, Matt Baker, Barbara Ludwig, Wade Miller, Dermot Ruane, Larry Miller, Gustav Düvel, and James Christiansen. Thank you to all *JIAEE* board members for helping raise its level of scholarship and notoriety. Also, my home department, Agricultural Leadership, Education, and Communications at Texas A&M University helped much in the production of the *JIAEE*.

Finally, thank you to all *JIAEE* contributors and reviewers for assisting in the production of this and all other issues over the past six years. Please continue doing what you can to promote greater understanding of agricultural and extension education worldwide.

Farewell,

Gary J. Wingenbach, Editor
*Journal of International Agricultural and Extension Education*
Today is Yesterday’s Future: Globalizing in the 21st Century

Barbara G. Ludwig  
Professor and Associate Dean  
Office of Outreach and Engagement  
College of Education and Human Ecology  
The Ohio State University  
Columbus, OH 43210  
E-mail: ludwig.2@osu.edu

Abstract

Where do we want to go and what do we want to be known for in the future? If we are to help people with widely divergent viewpoints engage in making decisions within a changing environment, technical and scientific expertise alone cannot provide solutions to issues which have political, ethical, and environmental impacts on communities and their inhabitants. We are not the university our grandfathers or grandmothers attended, if they earned a college degree. Nor is our outreach and engagement system like the one our parents may remember. This article discusses four challenges agriculture education and extension face as the 21st century advances, framing them in a global context: What is the role of public research universities? How do cross cultural exchanges impact students? Where does agriculture education and extension fit into the urban agenda? What benchmarks success for extension?

Challenges include the pace of change and expanding linkages between private sector firms, clientele, students and the international community. We may think local, but actions have global consequences. Thoughtful, well-intended actions are not enough to position us to lead change. We need to be able to change ourselves, our programs, and our institutions. To do that, we need to be informed decision makers. To be informed, we need data (research) that we can change into information. Information when applied to real world problems becomes knowledge. If that knowledge holds true over time, it may become thought of as wisdom.

Keywords: Agriculture Education, Change, Extension, Global

Acknowledgment: This paper was developed and refereed under special invitation from the JIAEE Editorial Board as a contribution to the annual Seminal Article Series.
**Introduction – The Way We Were**

The new millennium will offer multiple challenges to all educators, but there are unique challenges for agricultural and extension educators (A&E) that demand our immediate attention. As we set future research agendas, establish priorities for student learning and examine the role of extension in the 21st century, we should not try to remain the way we were in 1926 or 1966, or even 1996. Today we live in the first metropolitan century. This places stress on use of prime farmland, quality and quantity of water resources and on small towns as they shift to become suburban neighborhoods. *Scientific American* (2005) indicates the first decade of the 21st century witnessed a tipping point for the first time in history; more people live in metropolitan areas than outside them.

A primary challenge is expanding linkages among A&E educators, their clientele, private sector firms, clientele, students and the international community. We may think local, but actions have global consequences. “Throughout the world there are different models for conducting extension work. The national land-grant model of the United States, while widely admired is not common in other countries” (Johnson, Creighton, & Norland, 2006, p. 34). Christiansen (2005) reminds us of our shared role as social scientists who share common interests, needs and problems, regardless of our country or organizational structure. In 2005, he outlined postulates “AIAEE must address if the Association is to have an impact on agricultural development and agricultural education worldwide and the nations of its respective members” (p. 7). Readers should return to Christiansen’s article *Addressing the Right Issues and Raising the Right Questions in AIAEE* to refocus on mission and excellence.

Swanson (2006) indicates national agricultural extension systems in developing countries should refocus on getting farmers organized (example building social capital), increase farm income and rural employment and thereby help to alleviate rural poverty. The warning is clear, if we try to compete with multinational, life-science firms who are becoming the dominant source of crop production technologies, our public research and extension systems become redundant. If change does not occur, public agricultural research and extension will be outpaced by the private sector, will be of diminished economic value to the country and may be progressively downsized.

One of the biggest challenges we face is the speed of change. Firebaugh (2002) presented one view of change in the form of an historical tale.

The accelerating pace of change conjures up the tale of the 19th century British evolutionist, Thomas Henry Huxley, who realized he might be late to deliver his lecture. Huxley jumped into a cab, crying, ‘Top speed.’ The cabman urged his horse to go at its fastest pace. Suddenly Huxley stuck his head out the window, and called out, ‘I say, do you know where I want to go?’ Above the rapid hoof beats came the response, ‘No, your honor, but I’m driving as fast as I can.’ (p. 2)

Now, as then, a destination is imperative. We must holistically look at social, health, economic, environmental and agriculture production issues when defining problems, formulating solutions and determining destination.

Where do we want to go and what will be our legacy in these first decades of the twenty first century? How will agricultural education and extension prepare themselves to lead in fulfilling this legacy? Responding to emerging issues is not enough, we must anticipate change or risk losing competitive advantage and strategic options. This article examines four local (United States) issues having implications for A&E educators, framing them in a global context. Each reader’s individual challenge is to respond with their own article. By reading, thinking critically and writing to
share perspectives from your vantage point in another part of the nation or world you enrich all of us. The four issues discussed in this article are:

**Issue I: What is the role of public research universities?**
In the United States, a question we hear is: What is the role of public research universities? Are we responding to or ignoring the changing environment?

**Issue II: How do cross cultural exchanges impact students?**
Can we impact students through study aboard and international service learning? How can learning in one community be used to solve similar problems across the globe?

**Issue III: Where does agriculture education and extension fit into the urban agenda?**
Agricultural educators might argue does it need to fit. Barriers to change can be deep rooted and tied to past experiences or beliefs. What is our impact, relevance and effectiveness in a rapidly changing urban society?

**Issue IV: What benchmarks for Extension?**
Universities now talk about outreach and engagement. Extension, an integral component of land-grant universities must look more strategically at how it is positioned within the university and what metrics are being used to measure success. Is there a need to set new standards for social relevance, productivity, quality and service?

Independently and collectively answers to the four questions provides a basis for leading change. Each question will be discussed in turn.

**Issue I: What is the role of public research universities?**
Change will not be the only challenge to the American University in the 21st century. Integration of disciplines and application to address the issues facing our nation and our world are required. Scholarly inquiry and social responsibility are interconnected. For example, how can public research universities expand our fields of expertise such as health, agriculture and the environment that have particular relevance to the developing world? The Chronicle of Higher Education (Hebel, 2007) described American universities as now taking a more deliberate and comprehensive approach to where and how they invest time, money and talent. They search for ways to involve students...all the while looking to bring the benefits of this work back to their home states. (p. A38)

One measure of excellence for a faculty member is to demonstrate that one’s research has global impact. This must be viewed as going beyond publications to include stakeholder based research, strategic implementation and global advocacy.

American universities are reassessing their role in the changing global environment. Graham Spanier, President of Pennsylvania State University, led the Kellogg Commission on the Future of State and Land-Grant Universities (2001). The Commission delivered a warning:

“Institutions ignore a changing environment at their own peril” (para. 6). Spanier (2001) identified five areas for focus:

1. The development of students as citizens of the world is one of the biggest challenges facing higher education today.
2. Crossing the boundaries of academic disciplines if our scholarship is to realize its full potential.
3. In today’s international world, almost everything can be easily reproduced and distributed to a vast audience; intellectual property and the balance between the interests of the creators and its users must be balanced.
4. The digital age brings the technological means to make lifelong learning a
reality. We need to provide adequate infrastructure.

5. Online learning will lead universities in the 21st century to be increasingly global in scope aided by technology and involved with the pressing issues of society.

These five challenges and opportunities provide a strategy for how A&E educators can take charge of change the subtitle of Spanier’s report. A&E educators should become familiar with the Commission report, the five challenges and the opportunities the report presents.

One area to consider if our students are to become world citizens is the potential formation of strategic partnerships between universities in different parts of the world. A university may select a handful of key partners with the goal of fostering long-term relationships that lead to joint research, faculty and student exchanges and public service projects across disciplines. Hebel (2007) developed this concept in some depth describing how strategic partnerships are different from Memorandum of Understandings which often turn out not to extend beyond their originators within the faculty. Colleges of agriculture with established relationships with other universities could become leaders in creating strategic partnerships. An example is Michigan State University which is “building on agricultural research it has been doing for decades in Kenya, Tanzania and Uganda to include projects on science education, health, and veterinary medicine that broaden the way countries tackle issues such as climate change and disease” (p. A38).

Using this approach, even small departments or colleges can begin to make a difference globally by selecting a handful of key partners, developing faculty and student exchanges and research programs. If your unit has key partnerships in place, consider how to bridge the boundaries of academic disciplines even further to address broader issues. Collaborations involve cross-cultural dimensions and the pitfalls resulting from poor communication must be factored in. Etling and McGirr (2005) discuss partnerships and globalization in their article exploring important elements in development of partnerships including: commitment from the top, equity, enduring rather than episodic efforts, joint planning and shared goals.

Higher education must become embedded in developing countries. The growth of universities in the developing world will occur as governments recognize expansion of higher education as a key element in transitioning from a developing to a developed country. Connectivity and open source technology will contribute to worldwide enrollment growth, facilitate collaborative planning and expand the demand for higher education. Consider the opportunities growth of higher education in developing countries provides public research universities to meet the challenges outlined by the Kellogg Commission report, *Future of State and Land-Grant Universities* (Kellogg Commission, 2001).

A recent report from Carnegie (Daniel, Kanwar, & Uvalic-Trumbic, 2006) predicts 120 million higher education students worldwide by 2010. China has already overtaken the U.S. “as the world’s largest higher education system” (para. 3) enrolling over 16 million students in 2005. The Carnegie Report describes how World Bank “until recently discouraged countries from investing in higher education wanting a focus on basic education which the bank saw as having greater development benefits. Today, such agencies generally acknowledge that an educational system is an integrated whole requiring education” (para. 5) at all levels. Carnegie predicts a much greater role for private for-profit institutions and sees fees being charged for higher education rather than free enrollment for a select few subsidized by the government. Governments will have to establish quality assurance mechanisms and
are likely to be looking for expertise in this area. These changes offer universities opportunities for cross border enrollments, distance education and establishment of branch campuses.

Of course disincentives exist (Hebel, 2007). “Reward systems at many universities do not effectively reward or compensate faculty who get involved in international efforts” (p. A38) or ambitious interdisciplinary projects. Logistical support in seeking contacts abroad or planning travel can be cumbersome. The time to apply for grants and sustain international work is another barrier to building collaborations. Since September 11, 2001 international exchange of students and faculty critical to an internationalized university is increasingly difficult. Visa systems are cumbersome and there are bureaucratic obstacles. The reality of global interdependency argues that we cannot wait for world conditions to become more stable or the universities to eliminate deep rooted barriers.

It is personal advocacy that sparks change. There is no defined pathway to a globally competent university. Leaders, tenured faculty or staff professionals who are in a position to initiate change must begin the process. “Internationalization does not involve tweaking the academy around the edges...it requires presidents and leaders to: articulate, advocate and act” (Vidoli, 2004, p. viii). For example, University of Pennsylvania’s Global Initiatives Fund (2006) supports international teaching, research and engagement in all disciplines. High priority is given to interdisciplinary and cross disciplinary initiatives that include faculty from more than one school. The fund provides short term, non renewable financial support for promising projects.

**Issue II: How do cross cultural exchanges impact students?**

We must ask and answer the question: what do we want our students to become as a result of international assignments? Students who complete cross cultural exchanges return home far better prepared to work in a global economy. Students learn to think on their feet and use the resources available when they cannot rely on technology (Hebel, 2007). They develop skills in how to interact with customers, patients or school children from other cultures. It is time to explore a wider variety of cross cultural experiences than the traditional study abroad format which many colleges have implemented and to vigorously evaluate current study abroad programs to test their relevance and impact. This section explores several possibilities. For example, one variation offers on-campus course work at a local United State’s university combined with international travel and a service project in a developing country.

“American universities that have long been involved in research and service work abroad are taking a more deliberate and comprehensive approach to where and how they invest their time, money and talent” (Hebel, 2007, p. A38). It becomes increasing important for graduate faculty to explore programs that involve international exchange of graduate students. The focus of these exchanges is to explore how in different parts of the world we may search for similar outcomes but address problems in very different ways and use varying approaches to problem solving. Graduate students should explore how approaches can vary based on academic culture, events and national culture. Examples described in *Inside Higher Education* (Guess, 2007) included: research on the environment, health and safe food supplies. The approach begins with choosing university partners with similar scholarly standing to create a more cohesive community of scholars. A mathematics example is included in the article and describes a problem-focused American cultural approach which says, “it’s ok to cut some corners now and then as long as you get the problem solved.” The European approach is the complement: “you
do it right the first time and if it takes a very long time, then so be it.” Students learn to use different approaches to common problems. This leads to experiences which highlight that when dealing with complex issues there is more than one right answer and interdisciplinary scholarship brings about more creative approaches.

International service learning offers students an opportunity to participate in experiences that help to solve real problems in the community while providing the student with opportunities to learn and become leaders who can facilitate change. Reflecting on the AIAEE mission and revisiting the United Nations Millennium Development Goals (Acker, 2005) can help us to focus on local problems that require a global solution. Issues ranging from health care to childhood obesity to global warming have world-wide implications. Hundreds of American communities are confronting one or more issues that also severely impact a nation in the developing world. As a result of cross cultural exchanges, we produce students and citizens who can be proactive in assessing the pluses and minuses of a situation and then engage others in productive actions on the pluses and halting actions on the minuses. It is simply not enough to produce problem solvers always responding to a new threat. Acker (2005) writing in the Journal of International Agriculture and Extension Education urges AIAEE members to work on the tough problems which are seldom solved by a single discipline. We serve the local community by connecting it to a broader world.

The benefits of cross-cultural exchanges extend beyond student learning. The exchange of trade and capital has wide reaching implications not addressed in this article. The impact of globalization can be seen in the growing immigrant population and the desire of large industry to expand its ties with other countries (Hebel, 2007). Educators need to consider how their graduates can assist local companies or multi-national firms who may employ them to tap into emerging markets. Consider these facts from the 2007 U.S. Chamber of Commerce Report on Global Engagement (2006):

- Immigrants now supply from 12%-22% of the U.S. workforce in highly skilled occupations, with baby boomers preparing to retire, it is clear we need these workers now and in the future;
- Foreign born workers make up 44% of the U.S. workforce in agriculture;
- Foreign visitors spend an estimated $100 billion in U.S. travel sector; and
- Over 500,000 foreign students, researchers and scientists attend or are employed by universities.

Cross cultural experiences can occur without leaving home. American college students who service–learn on a local (U.S.) problem and reduce the severity of that problem locally then reflect upon it as a local, national and global concern. If local solutions such as web-based environmental and health information are developed, the information can simultaneously contribute to reducing the severity of the problem nationally and globally (Franco & Richards, 2006). Students from developing countries on our campuses can be engaged to translate web content into their native languages.

Integrating solutions-focused local and global service learning with study abroad brings new internationality to learning outcomes. A U.S. based cross cultural service learning opportunity can become an introduction to the global community for students who have not considered participating in study abroad or an international experience. First generation students who are the first from their family to attend college or go on to graduate study and those from rural areas often require additional encouragement and explanation of the need and benefits for study abroad experiences. Financial cost and time are traditionally reported barriers, but cultural realities must also be considered. A study by
Irani, Place, and Friedel (2006) reported land-grant “institutions and the students who attend them differ from private liberal arts schools” (p. 36). Many students attending public land-grants “come from small towns and rural areas where opportunities for international acculturation experiences are limited” (p. 36). For these students, an international experience can be threatening, a fact that needs “to be considered by institutions when planning international program experience” (p. 36). Further study is warranted.

**Issue III: Where does agriculture education and extension fit into the urban agenda?**

Today is yesterday’s future and the global village so many of us have talked and written about now exists as a part of a blossoming metropolis. According to the U.S. Department of Agriculture’s National Resources Inventory (Allen, Nelson, & Trauger, 2006, p. 4) an average of 43 hectares of U.S. farmland was converted to non agricultural use every hour each year between 1982 and 1992. Roughly one-fifth of the nation’s 101,250,000 hectares of prime agricultural land can be considered at risk for development because they are within 80.4 kilometers of the 100 largest cities in the nation. Worldwide one agricultural worker today feeds herself (women are the primary source of farming in the world) and one urban dweller; by 2040 she will need to feed two urban dwellers (Scientific American, 2005). Integrating technology and assuring a safe food supply becomes increasingly important under these conditions. By 2040 (Nelson, 2006), 60 million new jobs will be created and 100 million new Americans are expected with one third entering from immigration. As colleges of agriculture worldwide explore their niche in an urbanizing world, it is key to remember that everyone requires water, food, shelter, clothing and energy. Our colleges need to reflect on their research programs and make necessary curriculum revisions to prepare agriculture graduates to function effectively from 2008 to 2038 in a growing metropolis.

Many will argue agricultural education and extension should be careful not to jeopardize a long term relationship with traditional agricultural producers, funding sources and clientele by responding to an urban agenda. Others will advocate that perhaps extension’s role and agricultural education’s role is now in working with developing countries and with clientele who continue to live and work in rural areas where the expertise and contributions of agricultural and extension education will be most valued and appreciated by these traditional constituents. If we want to remain the way we were and take the risk of becoming marginalized that may be a safe solution. Rivera (2006) and Swanson (2006) argued to the contrary. If change does not occur, public agriculture research and extension will be outpaced by the private sector, will be of diminished economic value to the country and may be progressively downsized.

To look forward and lead, we need to address: What is our relevance in a rapidly changing society which is an urban society worldwide? Unless A&E educators rethink their mission and focus, entrepreneurial colleagues from other disciplines and universities will move forward to address emerging issues and successfully compete for public, grant and foundation monies. Population growth is driving the shift from agrarian to urban. It will take wise leadership to chart a course which maintains relevance to traditional stakeholders, but is inclusive of the new challenges and opportunities of an urban population. Coupled with a focus on urban society is also a focus on civic engagement. Civic engagement (Allen et al., 2006) can be defined as deliberative decision making by civic stakeholders and involves collaborative dialogue, tapping local knowledge and building common understanding. Orr (2006) offers questions educational institutions can use to catalyze a dialogue engaging the
public, government officials, media, NGO’s and academic institutions by asking: (1) What is the proper balance between the public interest and private rights? (2) By what combination of pricing, taxation, moral persuasion, and regulation do we arrest environmental degradation and loss of natural capital? (3) How do we balance the legitimate interests of future generations with genuine needs of the present generation? (4) What analytical tools (public health data, pricing, discounting, least-cost, end-use analysis) do we use to evaluate progress toward transformation? Other tough problems range from greenhouse gas and global warming to rainforests becoming farm land, competition for fossil fuels and water resources.

To be effective in leading global change, scientific and technical information must be made available in formats that enable wise, knowledge-based decision making at a local level. A paradigm shift for some educators will be moving from being the expert with the answers to a collaborator with citizens, business and industry to explore solutions and find collective answers. Even better would be anticipating change and mitigating potential problems. Holistically looking at education, agriculture, environment, communities, health, families and the interconnections is key if A&E educators desire urban relevancy and an urban legacy.

**Issue IV: What benchmarks for Extension?**

Measuring success in any program requires metrics. Universities are being called upon to be more accountable and benchmarking is done on an institution basis for outreach and engagement that includes extension. Extension in the future must expect to be compared not only to other extension systems, but to others conducting outreach and engagement programming. The terms outreach and engagement describe how faculty, staff, and students interact and contribute to the community to address problems and issues. Outreach is viewed as a one-way approach similar to what is often described as “service” while engagement is characterized by a more spiraling effect. Engagement is much like good development work undertaken with the people not for them; hopefully much of what land-grant extension is doing fits this definition. The Kellogg Commission on the Future of State and Land-Grant Universities report *Returning to Our Roots* (Kellogg Commission, 2001) states

Engagement goes well beyond extension, conventional outreach, and even most conceptions of public service. Inherited concepts emphasize a one-way process in which the university transfers its expertise to key constituents. Embedded in the engagement ideal is a commitment to sharing and reciprocity. By engagement the Commission envisioned partnerships, two-way streets defined by mutual respect among the partners for what each brings to the table. (p. 13)

The engaged institution must

- Be organized to respond to the needs to today’s students and tomorrow’s;
- Bring research and engagement into the curriculum and offer practical opportunities for students to prepare for the world they will enter; and
- Put its resources-knowledge and expertise-to work on problems that face the communities it serves. (p. 14)

Work is underway to develop metrics with a number of associations and groups each developing their own set of standards. The benchmarks most likely to gain universal acceptance will evolve as part of the Carnegie Classification System. Development of such a classification scheme is part of a broader reconsideration of the long established Carnegie Classification to better represent community engagement. Of the thirteen institutions selected to pilot the system, only Michigan State University and the University of
Minnesota are land-grant institutions (Rennekamp et al., n.d.). The new benchmarks will influence how those outside extension view its productivity, quality and service. A&E leaders must be observant of the benchmarking process underway, making contributions as requested. The Kellogg Commission’s (2000) emphasis on “discovery and engagement focused on pressing educational, social, economic, scientific and medical challenges” (p. 27) is likely to influence the markers. These include

- Learning environments that meet the civic ends of public higher education by preparing students to lead and participate in democratic society;
- Complex and broad based agendas for discovery and graduate education that are informed by the latest scholarship and responsive to pressing public needs; and
- Conscious efforts to bring the resources and expertise at our institutions to bear on community, state, national and international problems. (p. 10)

A&E faculty and leaders in the U.S. do not need to await the outcome of the process. Emerging documents can direct our proactive work to engage clients and students inform our teaching and expand our research.

**Conclusions and Challenges**

“It is what we think we know already that often prevents us from learning”

*Claude Bernard*

This article began with challenges agriculture education and extension face as the 21st century advances. We are not the university of years gone by. Nor is our outreach and engagement system like the one our parents may remember. Agricultural production and economic viability today are not enough. Environmental and social concerns demand, and matter, as much to the agricultural community as they do to urban neighbors in the global community we call home. Looking inward at what we used to be or behind ourselves at what made us great may not be helpful in building organizations that seek to reach eminence in the future. Research conducted over ten years ago (Ludwig, 1994) using Delphi methodology to forecast indicators of successfully internationalized extension systems identified clientele who develop a fundamental understanding of global and national interdependence as a critical benchmark. Spanier (2001) drew a similar conclusion in *Taking Charge of Change* citing “the development of students as citizens of the world as one of the biggest challenges facing higher education today” (para. 9). Levander (2000), in her thoughtful study of how extension education is taught at European universities, concluded with the statement: those intending to work as extension agents require theoretical understanding and methodological tools for managing the change process. Change seems to be a constant in today’s society and tomorrow’s future (Allen et al., 2006).

Where do we want to go and what is our legacy? We must develop in future agriculture and extension educators the skills needed to help people with widely divergent viewpoints engage in making decisions within a changing environment. It is evident that technical and scientific expertise alone cannot provide the solutions to issues which have political, ethical and environmental impacts on communities and their inhabitants. To paraphrase the Kellogg Commission: skillfully exercising the power to convene and to bring the resources and expertise at our institutions to bear on community, state, national and international problems in a coherent way is our charge (2000).

Platitudes and thoughtful well intended actions are not enough to position agriculture education and extension to lead change. We need to be able to change ourselves, our programs and our institutions. To that end, we need to be informed.
decision makers. To be informed, we need data (research) that we can change into information. Information, when applied to real world problems becomes knowledge. If that knowledge holds true over time, it may become thought of as wisdom. Thus, we must first seek data to inform (conduct research). germane research questions evolving from the points discussed in this article include:

What is the role of public research universities?
- Are we making the best choices to get results in an increasingly interconnected world?
- Are we building the kinds of teams and relationships with others that we need to solve problems effectively in today’s world?

How do cross cultural exchanges impact students?
- Are we taking the long view? Are we making choices that will leave the world a better, safer place for our children and grandchildren?
- How do we assess the outcomes of study abroad and service learning?

Where does agriculture education and extension fit into the urban agenda?
- Are our policies and actions consistent with the land-grant mission and vision?
- Is the Land-Grant mission and vision consistent with the needs of a highly urbanized society?

What benchmarks for Extension?
- What do we want our students and our citizen clients to become? What are our impacts?
- What are performance indicators for globalization of extension and agricultural education?

References


How do the Russian Citizens of Dmitrov Hills Conceptualize Genetically Modified Foods?

Curtis R. Friedel  
Louisiana State University  
142 Old Forestry Building  
Baton Rouge, LA 70803-5477  
E-mail: cfriedel@lsu.edu

Courtney A. Meyers  
University of Florida  
E-mail: cameyers@ufl.edu

Nadezhda N. Mamontova  
Pennsylvania State University  
E-mail: nzm111@psu.edu

Tracy A. Irani  
University of Florida  
E-mail: irani@ufl.edu

Abstract  
The purpose of agricultural biotechnology was initially to address challenges producers face in the production of food. Through genetic modification, crops have been developed that are resistant to drought, heat, insects, and diseases. Despite varying opinions toward GM foods, especially in European countries, the production of GM crops continues to increase. Although most European countries have already developed policies on GM foods, Russia’s official stance on agricultural biotechnology has been inconsistent. Russian President, Vladimir Putin, has named biotechnology as a scientific innovation that will benefit Russian agriculture. However, the Russian Ministry of Agriculture is encouraging the development of an “organic” agricultural market. The decisions of the Russian government will influence the rural Russian population the most regarding their opinions on the economic and environmental issues associated with producing genetically modified foods. Opinion polls and surveys have been conducted concerning the acceptance of this technology in Russia, but little has been done to determine why Russians perceive this technology as acceptable or unacceptable. That is, how do Russians conceptualize genetically modified foods? To answer this question, interviews were conducted in a rural Russian village, Dmitrov Hills. The qualitative data were analyzed through content analysis to identify overarching frames to contextualize how rural Russians conceptualize genetically modified foods. From the data, three frames emerged: not ecologically pure; it doesn’t concern me; and trust in science. The researchers also found that most participants did not understand the concept of a genetically modified food, even when given an example.

Keywords: Agriculture, Biotechnology, Genetically Modified Food, Russia
Introduction/Theoretical Base

According to the United States Department of Agriculture (2005), agricultural biotechnology includes “traditional breeding techniques that alter living organisms, or parts of organisms, to make or modify products; improve plants or animals; or develop microorganisms for specific agricultural uses” (¶ 1). Genetic engineering or genetic modification (GM) is also a component of modern biotechnology. From 2005 to 2006, the amount of biotech crops planted worldwide increased 13% to 102 million hectares or 252 million acres (James, 2006). The United States, Argentina, Brazil, and Canada lead the world in biotech crop production with the most planted GM crops being soybeans, corn, cotton, and canola (James). It has been argued that the increased efficiencies of GM crops may give countries opportunities to export the surplus not used domestically. Yet, European import restrictions on GM foods present an obstacle in the global use of this technology (Falk et al., 2002). European resistance of biotech foods is markedly greater than that of the United States which may be attributed to differences in the amount of media coverage, trust in regulations set by government authorities, and suspicious perceptions of food safety (Gaskel, Bauer, Durant, & Allum, 1999; Irani, Sinclair, & O’Malley, 2001). Despite varying opinions toward GM food, the production of GM crops continues to increase (Hoban, 2004).

Agricultural biotechnology was initially developed to address challenges producers face in the production of food. Through genetic modification, crops have been developed that are resistant to drought, heat, insects, and diseases. These crops can also have increased nutritional content, increased yield, and reduced post-harvest losses. These aspects make the adoption of GM crops in developing countries seem attractive. Despite these positive factors, many countries are opposed to the adoption of GM foods for fear of adverse effects to human health and the environment. Other countries simply lack the market capacity and infrastructure necessary to produce GM foods (Pew Initiative on Food and Biotechnology, 2004). However, individual consumer acceptance of agricultural biotechnology can vary within countries and contributing variables may include age, socio-economic status, political affiliation, and food application uses such as plant versus animal, and processed versus whole foods (Irani et al., 2001; Vestal & Briers, 2000; Zepeda & Douthitt, 1999).

Russian Agriculture and Biotechnology

Russia, the largest country in the world, is a player in regional and global agricultural markets. Russia’s agricultural industry includes 133 million hectares of farmable land and 14% of the Russian labor force work in agriculture to feed 147 million inhabitants (Economic Research Service, 2004). The leading crops grown in Russia include wheat, sugar beets, potatoes, corn, barley, rye, oats, sunflowers, and cotton (USDA, 1994). Currently, farms in Russia can be categorized as corporate, subsidiary plot, and private. Corporate farms are the original state and collective farms from the Soviet era and continue to operate much as they did since reforms began in 1992. These farms occupy approximately 90% of Russia’s arable cropland, supplying 90% of the nation’s grain and sugar beet production and almost half of the livestock production (Osborne & Trueblood, 2002). After the fall of socialism, subsidiary plots and private farms emerged. Subsidiary plots refer to small divisions of land originally owned by collective farms, but now are owned by local families for the purpose of growing and raising their own food. These plots account for only 5% of arable cropland, but contribute more than 50% of the total agricultural output (Osborne & Trueblood). Private farms were started when collective farm workers who wanted to become independent farmers were given tracts of land.
land. These are equivalent to family farms in the United States and occupy 4% of the total arable cropland (Osborne & Trueblood). According to Dr. Pavel Sorokin, Professor at Moscow State Agro-Engineering University, production and efficiencies in both private farms and subsidiary farms are increasing (P. Sorokin, personal conversation, February 28, 2005).

Since the devaluation of the ruble in 1998, investments in Russian agricultural production have slowly grown; production increased by 5% in 2000 and 6.8% in 2001. This increased production has impacted the Russian agricultural market by creating more competition; in turn, producers are forced to improve efficiency through utilization of new technologies. This includes the option of growing GM foods (Borodina, 2002).

Russia’s official stance on agricultural biotechnology has been inconsistent. Russian President, Vladimir Putin, has named biotechnology as a scientific innovation that will benefit Russian agriculture. However, very limited federal funding is available for agricultural research and application of GM products. Russia is also lagging behind other industrialized countries in the adoption of commercialized GM crops for production. Although two GM crops have been approved for production in Russia (AGBIOS, 2006), current government environmental regulations prevent the commercial production of either crop. All food and feed imports containing GM ingredients must be registered and certified (United States Department of Agriculture Foreign Agricultural Service [USDA FAS], 2005). Russia also has mandatory labeling regulations for GM foods (Huffman, Rousu, Shogren, & Tegene, 2004). In addition to economic benefits, the use of GM crops may help the little protected Russian environment by reducing pesticide use (Demin, 2000).

Several barriers to the growth of agricultural biotechnology exist. For example, the Russian Ministry of Agriculture is encouraging the development of an “organic” agricultural market. Another barrier is the expense required to build an agricultural infrastructure and modernize farming practices through more efficient machinery and agricultural chemicals. Also, Russians fear the unknown possible adverse affects of biotechnology to their own health and the environment (USDA FAS, 2005).

Transfer of Agricultural Knowledge

Russia’s agricultural knowledge transfer system includes agricultural education, extension, training, technology transfer, and agricultural research; however, this is very limited in scale compared to that of the United States. In the past, narrowly-focused Russian specialists provided information services to agricultural producers on state and collective farms. This system worked well with a small number of clients, but neglected the needs of more than 280,000 private farmers and 50,000 structured farm enterprises. This system also ignored the needs of 40 million household
subsidiary plot holders, whose number will continue to increase (Mudahar, Jolly, & Srivastava, 1998). The Russian agricultural academic system, comprised of agricultural vocational training schools, scientific research institutes, agricultural higher education institutions, and technical agricultural colleges produces agriculture knowledge, but this information is not effectively linked to the knowledge transfer system to distribute it to those who could best use the information (Mudahar et al.). As more food and agricultural issues emerge in Russia, it is evident that a fully operational extension system in partnership with the Russian government is needed to address these new concerns (Rivera & Alex, 2004).

In 1991, the USDA’s Cooperative State Research, Education, and Extension Service (CSREES) developed a seven-year project to help Russian agriculture shift from the former state-operated collective farms to private farms. The Russian-American Farm Privatization Project (RAFPP) developed a U.S. style farm in Russia where American farm families lived and served as mentors to Russian farmers. In 1996, the RAFPP worked with Russian and American universities to develop an agricultural knowledge transfer system which mimicked the U.S. Extension Service. This extension system was implemented in two Russian regions (CSREES, 2005).

Attitude toward GM food

Few comparable opinion polls of public attitudes toward GM food have been conducted, but the available data indicate consumer attitudes differ greatly with opinions changing over time (Hoban, 2004). In the United States and Canada, consumers are typically accepting of biotechnology use to develop new plants, but are less accepting of biotechnology use in animals. North American consumers seem generally optimistic about the future uses of biotechnology. In contrast, Europeans are more negative in their views of biotechnology. These consumers have voiced desire to have GM food products separated, identified, and labeled. In developing countries, consumers are challenging government control of biotechnology and want more visible accountability in the regulatory process (Cantley, Hoban, & Sasson, 1999).

The Russian consumer is somewhat aware of agricultural biotechnology, but much of the information presented to the public via media sources has focused on publicized concerns of anti-biotechnology non-governmental organizations. As a result, Russian retailers and producers have tended to avoid food products that may contain GM ingredients. Further, many Moscow residents, the largest consumer market in Russia, are supporting the “organic” food trend. In response, the Moscow city government has established a council to monitor the use of GM ingredients in food products (USDA FAS, 2005). Given the above, Russian consumers might benefit from educational programs aimed at addressing issues of biotechnology in order to make logical decisions concerning perceptions to GM foods (Falk et al., 2002).

Environics International (2000) conducted an international study of consumer attitudes toward biotechnology in 35 countries. With regard to Russia, given the statement, the benefits of using biotechnology to create genetically modified food crops that do not require chemical pesticides are greater than the risk, 40% of Russian respondents agreed, 23% disagreed, and 37% were not sure. Greenpeace (2005) polled 1,567 Russian citizens of various demographics and found that 31% were not aware of GM food products and 65% of the respondents found these products unacceptable.

Since the move from collective farming to capitalized entrepreneurial operations is still relatively recent, it is unclear how much changes in the political system may have impacted Russian beliefs and perceptions toward agriculture in general and controversial food technologies
in particular. Given the size of the Russian agricultural market, combined with its recent political history and the ambivalence of Russian conceptualizations of the nature and acceptability of GM food products, a new view towards determining the appropriate role for educational and extension programming is needed within this unique context.

The literature previously cited serves to quantify opinions of Russian citizens, but has not been able to address the basis for these opinions. The literature gives evidence that Russian citizens have few experiences with GM products, so do they understand the benefits and drawbacks of this technology? How does this limited experience affect Russian citizens’ decisions to accept GM products? How much does their culture play a part in this decision?

**Diffusion of an Innovation**

In many ways, a consumer’s decision to use GM foods can be connected to Rogers’ (2003) theory of diffusion of innovations. Rogers (2003) states that for one to adopt an innovation one must first have initial knowledge of the innovation and then have a favorable attitude toward the value of the innovation. This attitude is formed by the individual after gathering enough information to determine the innovations advantages and disadvantages. During the information gathering process, the individual examines the attributes of the innovation to determine if the innovation is better than the current alternative, is consistent with values and past experiences, is simple to understand, is able to be experimentally sampled, and is visible by others (Rogers). Rogers’ theory has been used extensively to provide insight into how farmers decide to adopt an innovation, but limited research exists concerning consumers’ adoption of an innovation with regard to acceptance of GM foods. If Russian citizens are gathering information about GM foods, what is their assessment of the attributes associated with GM foods?

**Purpose**

The planning of this study began from the authors’ previous research regarding international extensionists’ information campaigns regarding biotechnology (Davis, Irani, & Payson, 2004), international students’ perceptions of biotechnology (Irani, Rudd, Friedel, Gallo-Meagher, & DeFino, 2004) and collaboration with an international initiative to teach and conduct research in Russia (Chumakov, Bruening, Frick, Friedel, & Moreno, 2006). The purpose of this study was to further explore the specific question: How do Russian citizens in a small rural community conceptualize GM foods? A rural community was chosen as the focus for this study in an attempt to look at conceptualizations of GM foods in the context of changing agricultural systems of production.

**Methods and Data Sources**

A qualitative research method was chosen to address the research question. “Qualitative research is a naturalistic, interpretative approach concerned with understanding the meanings which people attach to phenomena (actions, decision, beliefs, values, etc.) within their social worlds” (Snape & Spencer, 2003, p.3). This type of research aims to gather an in-depth and interpreted understanding of individuals’ perceptions, attitudes, histories, experiences, and perspectives. This approach allows the data to emerge from the participants, respecting the individual responses and uniqueness of each situation (Snape & Spencer).

To conduct this study, the lead researcher conducted face-to-face, in-depth interviews with participants in the village of Dmitrov Hills, Russia. In-depth interviews are a popular data collection method in qualitative research because they are flexible and interactive, elicit detailed responses, expose new knowledge, and occur in the natural setting. The researcher used semi-structured interviews with a list of questions...
developed from previous studies concerning international perceptions of biotechnology (Irani et al., 2004) while also remaining flexible and allowing participants to guide the discussion (Legard, Keegan, & Ward, 2003). Questions were translated into Russian and e-mailed to city officials of Dmitrov Hills two weeks prior to data collection. Specifically, these questions were: 1) What kinds of food improvements would you like to see; 2) What is your opinion of genetically modified foods; 3) Should genetically modified foods be labeled; 4) How did you come to the point of view you now have about genetically modified foods; 5) In 2003, the American government sued the European Union because they would not buy genetically modified foods. Do you agree or disagree with the decision of the American government? Why do you agree or disagree; and 6) Do you believe that Russia farmers should grow genetically modified foods for Russians to consume? All participants viewed the questions prior to data collection and were supplied the interview questions in Russian text during data collection. Interviews were conducted inside the participants’ homes with the use of a translator native to the village. Interviews were audio-taped and later transcribed and translated into English by the researchers.

Data Sources
The village of Dmitrov Hills was chosen through convenience as personal contacts provided information and transportation to this village. Dmitrov Hills was also selected for this study because residents were still largely employed by the former collective farm and knowledgeable about agriculture. The lead researcher asked village leaders to describe the population of Dmitrov Hills with regards to education level, methods of receiving news and information, as well as association with agriculture. A village leader also helped identify 20 willing and available participants who were representative of the demographics of the village. All participants were native to the village. From this group of participants, 12 were female and eight were male with ages ranging from 19 to 79 years. Occupations of the participants can be summarized as follows: six teachers (one was retired), six associated with work on the former collective farm (two were retired), three working in business (one was retired), three college students, one independent farmer, and one district mayor.

Data Analysis
The researchers chose a qualitative design for this study, because the data sought were considered sensitive with a high degree of complexity to the participants. The interview process allowed for focus on issues revolving around biotechnology while permitting unexpected phenomena to be expressed for greater understanding. Qualitative data analysis techniques are numerous and vary according to the research design. For this study, researchers chose content analysis to analyze the interview data. In content analysis, the researcher focuses on the context of the document to identify themes (Spencer, Ritchie, & O’Connor, 2003). This process derives coding categories and themes directly from the data allowing a deeper understanding of the information (Hsieh & Shannon, 2005). These themes can also be conceptualized as frames, which are “organizing principles that are socially shared and persistent over time, that work symbolically to meaningfully structure the social world” (Reese, 2003, p.11). Frames are used to determine what content is relevant to discussion of a concern; to determine the language used to discuss a topic; and to outline the values and goals of the content area (Hertog & McLeod, 2001).

To identify frames, Johnston (1995) advocates the use of micro-discourse analysis which “takes a specific example of written text or bounded speech and seeks to explain why the words, sentences, and concepts are put together the way they are”
Researchers analyzed the in-depth interviews to code patterns and relationships found within the data (Johnston), which then formed the prominent frames (Fisher, 1997). A simple representation of a frame often provides one a context in which to view the phenomena, interpret meaning, and form an opinion. Researchers analyzed the data in English and then compared results to Russian transcriptions to improve dependability and trustworthiness. Furthermore, the lead researcher kept a reflective journal of thoughts and conceptual relationships throughout the data collection process.

**Findings/Results**

Leaders of Dmitrov Hills were asked demographic questions concerning the village of Dmitrov Hills with specific questions regarding association with agriculture, education level of citizens and methods of receiving news and information. Dmitrov Hills (population 1,395), is located 300 kilometers east of Moscow. Most families, regardless of employment, maintain gardens for growing fruits and vegetables. Many have chickens, and approximately half of the families have one cow or one to three pigs. Describing the education of Dmitrov Hills’ citizens, village leaders estimated that 10% have an equivalent of a four-year college degree and approximately 60% have had some form of technical education related to their employment. Two technical universities are located within 50 kilometers of Dmitrov Hills. Most people living in the village acquire news and information through television, newspaper, and word of mouth.

Data analysis of the interview transcripts identified three emergent frames: 1) Not ecologically pure; 2) It doesn’t concern me; and 3) Trust in science. These are further discussed with detail given to each frame.

**Not Ecologically Pure**

Russians, in general, are very conscious about their health and the health of loved ones. To formally say “hello” in Russian, one says “Здравствуйте” (pronounced zdravstvuyte), which literally translates to “Good health to you” in English. Furthermore, Russians commonly relate good health to eating, drinking, and cleanliness. When Russians were asked “What food improvements would you like to see?” the most common response was that they would like to see more natural food. For example, one participant said she wished foods would “…be more natural, ecologically pure, safe for a healthy person” (Participant 12).

The term “natural” was commonly used to refer to foods grown without the use of pesticides, fertilizers, chemicals, or supplements used to enhance produce or meat. Another participant elaborated, “I would prefer...more natural, those closer to natural products. So, I would prefer if there were less chemicals. Also, I would appreciate if the control over those supplements in Russia improved” (Participant 19). This participant used the term “natural” in reference to any additives used during the processing of food. Many participants discussed how natural food was better compared to the use of additives in food bought at the store. One participant complained, “…like sausage with soy is not our liking…” (Participant 20).

Another participant said “…they produce foods with these “E” signs [on labels]...English “E” means artificial coloring, artificial, not natural” (Participant 16), referring to imported processed food. Although this was the only participant who mentioned an “E” on the label represents an unnatural food, it is important to note that he now has a negative view of all imported food with an “E.”

Only a few participants seemed content with the quality and availability of food; one participant stated, “Well, everything is fine now. You can buy quality...
Foods now” (Participant 18). With these few participants, there seemed to be an insinuation that the quality of food is dependent on the price you pay. That is, everyone lives up to one’s means.

In the second question, participants were asked of their opinion concerning GM foods or biotechnology. It was quickly realized that participants did not understand the technology associated with the term. After a couple interviews, the lead researcher began using the example of a GM potato resistant to the Colorado Beetle; a case relevant to Russian agriculturists. It was found that, even with the use of this example, most participants still could not differentiate GM technology from chemicals, pesticides, fertilizers, additives, supplements, or vitamins. Simplified, the researchers believe that even with the example of biotechnology, most participants did not understand the concept.

Participants who did understand the concept of GM foods still were unaware of the benefits of this technology, or chose to ignore those benefits. A participant explained, “To tell the truth, I am not an expert in the area. Well, I heard about this issue, but personally, I’d rather not. Nature is nature. It is better to grow naturally” (Participant 18). With further questioning, a couple of participants could give examples of a GM product before the Colorado Beetle example was given. However, it was evident that these same few participants were unable to convey characteristics of GM products in terms of benefits, disadvantages, concerns, or how the products were made.

The lead researchers asked participant nine, an agronomist, “What would you do if you had an opportunity to improve the quality of the potato, or productivity, by using genetically-modified seed, for example?” She responded, “I would probably defend my point of view, I can repeat it. We should grow potato from seeds that we buy [locally] or grow ourselves” (Participant 9). As an agronomist, this participant had knowledge of the Colorado Beetle resistant potatoes and other beneficial characteristics of GM foods prior to the interview, but decidedly associated the technology with creating ecologically impure foods.

Regardless if participants understood the concept of GM foods, they still identified GM foods as unnatural and, therefore not healthy to eat. For example, one participant said, “Well, as for resistance it is clear, it is for the plant, but what about the human body? I, for example, not sure about it. What influences will it have on the human body and development?” (Participant 13). Many discussed the unknown effects to the human body, but unknown effects to the environment were never considered by the participants. Another affirmed: “There shouldn’t be anything like this at all, everything should be produced naturally. Everything should be produced naturally... Why would you do that? It [Food] used to be tastier... Apples are tasteless now... It is better when you grow your food rather than buy” (Participant 8).

Because the unknown effects to the environment were not mentioned, one could assume that the participants were either unaware of these effects because of lack of knowledge, not valuing the environment, or the unknown effects to the human body were too great to consider anything else.

Throughout the data, the term “organic farming” was never used; however, the data did give evidence that Russian participants classify any food grown or processed through methods not occurring in nature as not ecologically pure. Thus, GM foods were identified as not ecologically pure.

It Doesn’t Concern Me

As noted above, citizens of Dmitrov Hills had their own gardens and raised their own poultry, beef, or pork. Although some produce, meat, milk, and eggs were bought from stores, a considerable amount of food was raised at home. Because of this, many participants viewed GM food as not
pertaining to them. One participant declared, “First, we probably don’t have many of them [GM foods] here, maybe somewhere in big cities...We grow foods ourselves, in gardens, we don’t have genetic stuff” (Participant 16). Participant 12 stated, “We don’t come across it in our life, for example.” When the researcher asked this participant if urban citizens should be more informed, she responded, “Yes, maybe because they have more choices in stores...We grow our own foods anyway” (Participant 12).

Addressing the European Union’s rejection of the United States’ GM products, a participant exclaimed, “I don’t care; I am neither for nor against it. This is Europe’s problem, this is the problem of America, and these are their problems” (Participant 4). When participants were asked to discuss the issue of the European Union rejecting United States GM products, it was evident that most were not aware of the situation and asked questions to clarify.

Many participants were ready to admit that they know little about GM foods. “We are probably just not used to them. We haven’t heard much about them” (Participant 2). Another participant asserted, “We practically don’t have any experience of producing it and very little experience of consuming. That is why I cannot say a lot about it” (Participant 20). Furthermore, participants were hesitant to take a position for or against biotechnology because of their little knowledge. Participant one said, “I don’t know, of course, maybe everyone has his own truth, maybe there are some pluses, maybe they are necessary, those modified products” (Participant 1).

A few participants admitted they were scared of this technology because they did not understand it. Other participants continued to ask questions to learn more about GM foods and biotechnology. These questions typically pertained to America’s use of GM foods and it was noted that these participants were more accepting of the technology.

Comments made by participant four seemed to summarize this frame by stating, “It is an issue for them, I see. For us, it is a very distant thing. It is not a problem for us; we don’t have this issue” (Participant 4). The researchers believe the largest contributor to this frame is the lack of understanding of GM products. This lack of understanding could change over time as these participants learn more about the benefits and drawbacks of this technology. As the Russian government and agricultural industry make decisions concerning GM foods, this issue may become more relevant and meaningful to these participants affecting the way these products are perceived, which has implications for potential education/extension efforts in this area.

Trust in Science

Russians have been long advocates of science. For example, Russia launched the first man to orbit the earth and now is among the three countries that have sent men into space. That trust in science is still present today, despite the economic and political troubles Russia has endured during the last 20 years. This belief in science carried through to the third identified frame when participants were asked to take a position on GM foods. Specifically, the question was, “Do you believe that Russian farmers should grow genetically modified foods for Russians to consume?” Among the participants, six were against growing GM foods on Russian soil. This group tended to be older and female. One participant deliberated, “Actually, I don’t know, it seems to me they shouldn’t. Maybe the yield will be higher, but it is useless, and you eat something that you don’t know what it is” (Participant 5).

However, 14 participants were in favor of using the new technology. Most of this group accepted raising GM products on Russian farmland if declared safe by Russian scientists. Participant 15 assessed, “…because this thing hasn’t [been] fully
researched yet, I think that before approving it, it should be studied” (Participant 15). Another participant discussed, “Well, as a dilettante, if it is proven that it is quite safe and edible, why not? Let them grow” (Participant 14). These participants were aware that they knew little about GM products, but if science gave evidence that GM products were safe, they were willing to accept the technology.

Russian or independent scientists were preferred by the participants, as another explains, “And why not, I think our scientists’ research didn’t fall much behind of American [scientists]” (Participant 17). Others preferred independent scientists to Russian or American scientists. Regardless of the scientists’ affiliation, the data suggest that these Russian participants will trust the evidence from science.

Other participants were simply open to the thought of raising GM products. “I think we certainly should begin,” declared participant 19. A few participants supported their decision citing a free market. For example, “Well, if there is demand, why not grow them? What is the point?” (Participant 3). Another participant agreed, “We probably should try everything...Maybe it would be more profitable” (Participant 2). Only these two participants saw the economic advantage of growing GM products with favorable results.

It is noted that participants who rejected the idea of growing GM products tended to draw clear distinctions between nature and science and that science should not interfere with natural food. Participants who accepted the notion of Russian farmers growing GM products said science could answer their questions concerning how this technology supports human sustainability. This majority sought more evidence concerning GM foods and said science could help in forming their opinions.

Conclusions and Implications

This study was limited as the translation of Russian to English may have altered interpretation and meaning from the data. To address this issue, care was taken to include a translator who was a native born Russian and schooled in social science methods as part of the research team. Although, one cannot generalize from qualitative data, these findings may be transferable to other similar environments within rural Russian villages.

First, it was apparent that many of these participants did not understand biotechnology as defined in this study; namely, a method of altering organisms or food for specific agricultural uses (USDA, 2005). The few participants who demonstrated their knowledge of biotechnology were still not conversant in the advantages and disadvantages that biotechnology has in relationship to the environment, economy and society. However, this finding supports the belief of Falk et al. (2002) that more work needs to be done to provide and disseminate objective educational materials so that individuals can make more informed decisions concerning biotechnology. In light of this finding, questions arise concerning the validity of the quantitative studies conducted by Environics International (2000) and Greenpeace (2005). If Russian villagers based in rural farm communities do not understand biotechnology, their ability to form opinions about its acceptance is limited (Rogers, 2003). This implies that there may be a particular need to focus educational efforts on enhancing understanding of these rural stakeholders who may be most affected by changes in governmental policy. Targeted extension efforts have a significant role to play in this effort aimed at enhancing the level of discourse in biotechnology related policy discussions.

The emergent frames found in this study provided evidence as to how participants conceptualize GM foods. In the first frame, these Russian villagers
conceptualized GM foods as not ecologically pure. The participants never used the term “organic” when referring to food, but a review of the data indicates that the terms “natural” and “ecologically pure” could be used synonymously. This finding indicated that GM foods (even when partially understood) were associated with chemical additives and pesticides and therefore unhealthy. This finding confirms previous research (USDA FAS, 2005) that Russians fear the unknown attributes of biotechnology when their health is at stake. Said differently, the attributes of the innovation, GM foods, may not be congruent with the values and past experiences of these Russian citizens. If this is true, the adoption of GM foods by these Russian citizens may hinge on their ability to accept a different value system (Rogers, 2003). It would be useful for extension efforts to identify exactly how the concept of GM foods conflicts with Russian citizens’ values to improve educational discourse regarding this technology.

In the second frame identified by the researchers, participants said biotechnology was not a part of their lives so it did not concern them. The evidence suggests that this is largely true. Most of these Russian villagers grew or raised their own food and farmers were prohibited by the Russian government from growing biotechnology foods commercially (USDA FAS, 2005). The stability of this frame is contingent on the future decisions of the Russian government to further endorse biotechnology. Russia may not want to grow GM crops if it wishes to export food to the European Union, as EU countries restrict the importing of GM foods (Falk et al., 2002). However, if Russia wishes to compete in the agricultural market with the United States, Argentina and Brazil, GM crops may be necessary (Borodina, 2002). Nevertheless, given the increasing number of GM crops planted worldwide (Hoban, 2004), biotechnology may still become a part of these Russian villagers’ lives.

The final frame identified in this study was that these Russian villagers trusted in science. Most of the participants claimed they would accept growing GM crops if scientists verified the food as safe for human consumption. Those participants against raising GM foods, even if scientists claimed the food safe, were advocates of nature and drew sharp distinctions between food grown naturally and food grown with artificial elements. The data suggest that attitudes toward the acceptance of biotechnology vary among the participants, which was not that different from other countries (Hoban, 2004). However, realizing that these participants classified GM foods in the context of science versus nature may help in the development of objective curriculum to further educate Russian citizens about biotechnology. Because this group of Russian citizens grows their own food, extension efforts may focus on the trialability of the innovation (Rogers, 2003). Educational discourse may include experiments that allow Russian citizens to grow both natural and GM foods in order to identify differences between the two products. As Russians gain more experience with GM products, their perceptions and opinions will evolve (Reese, 2003). How the conceptualization of GM food evolves could depend, to a great extent, on the quality and effectiveness of educational efforts aimed at enhancing public understanding.

This study developed a starting point in the understanding of how people in rural Russia conceptualize GM foods and generated many questions. How will the emergent frames from the data change as the Russian participants gain more knowledge? Do urban citizens of Russia have the same opinions about GM foods? How will these attitudes impact the environmental and economical issues of Russia? Will these perceptions be expressed to the Russian government to the point that it affects policy decision? This study also shed some light on how low levels of awareness and public understanding might influence
conceptualizations of GM food products, even in agriculturally-oriented settings. Participants in this study shared concerns, yet had conflicting viewpoints and some misconceptions about applications of this technology, pointing out a need for education in this area. However, one of the criticisms of agricultural biotechnology has been the tendency to focus on educational efforts on public acceptance, rather than public understanding and informed decision making. These findings represent a challenge for both formal and informal educators alike with respect to developing educational programs that enhance public understanding in an objective and non-biased way.

References


Creating Educational Opportunities for Rural Adults in Ireland: The V-learn Experience

J. James F. Phelan
School of Biology and Environmental Science
Agriculture and Food Science Centre
University College Dublin
Belfield, Dublin 4
E-mail: james.phelan@ucd.ie

Elizabeth Mulhall
School of Biology and Environmental Science
Agriculture and Food Science Centre
University College Dublin
Belfield, Dublin 4
E-mail: lily.mulhall@ucd.ie

Abstract
Technology has revolutionised the way people live and learn. The advantages are numerous and include the availability of cohesive learning materials, flexibility of learning, the removal of distance as a major entry barrier and time saving, once courses are developed. The constituent universities of the National University of Ireland have worked together over the last ten years using an action research approach in developing a blended learning system for rural development activists. Critical components of the model developed include a core of academic managers, a team of lecturers across a wide range of disciplines, a set of tutors and specially developed content delivered via CD and Blackboard™. The use of student tutorial groups (learning cells) and inter-college seminars are seen as major contributors to high retention rates. Over 300 adult learners have participated in this system of learning and 55 have graduated with a BSc in Rural Development, while the remainder graduated with diplomas. A detailed evaluation of results, external examiner’s reports and focus-group discussions show that their performance is on par and in many cases exceeds that achieved with traditional learning systems. A survey of students completing the programme shows that they rate the system on par or better than traditional face to face learning systems. The paper details a case study of the development of the V-learn.ie model in Ireland and concludes that it is innovative in structure and in the extent of expertise that it can present to rural people. These developments have implications for extension as eLearning is increasing in popularity among extension organisations.

Keywords: Adult, Computers, Development, Education, eLearning, Learning, Rural
Introduction

The knowledge economy in which rural populations operate is becoming increasingly global and highly competitive (Brinkley, 2006). Consequently, many national governments see an increase in the quality and quantity of adult and continuing education programmes as a priority and educational institutions are charged with the task of designing programme curricula to achieve these policy aims.

Higher education today operates in a new era, an era that is much more conscious of the market place. Market forces, globalisation, internationalisation, competition, cost efficiency and quality are all terms that appear with increasing regularity in university documentation (Green, Echel, & Barblan, 2002, p. 8). These are the new drivers as universities position themselves in the increasingly competitive world of education. Like any business, universities are not immune to the impact of technological developments and it is in this area that the most profound changes may yet occur. “In higher and post primary education, the borders between distance training and traditional training provision are becoming gradually blurred” (p. 8). The “disappearance of technical barriers and the proliferation of partnerships and pilot experiments at the European level” are increasing (European Commission, 2000, p. 8). Some universities are “adopting new business models in order to respond to the changing education market and the challenges posed by global competition” (European Commission, 2002, p. 5). The “Virtual Classroom” is now a reality and universities are gearing themselves for this new challenge.

These changes are occurring at a rapid rate and as is the case with all technology, it is young people that gain proficiency the quickest. Most faculties in universities were hired and have operated for a considerable number of years before the advent of the World Wide Web and thus may find it difficult to embrace its implications, a fact clearly noted by Caplan (2004). However, in spite of reluctance at the beginning, academic staff and institutions are slowly beginning to appreciate the opportunities presented by these new technologies. This can be evidenced by the fact that many universities now host electronic learning platforms such as Blackboard™ or WebCT™. The importance of this development is stressed by Elloumi (2004) who noted “a vision of excellence for online learning is not a choice, but a market driven imperative” (p. 66).

Many adults are returning to the workplace while many others are availing of educational opportunities, which were not available to them decades earlier. While most students in Ireland still enter university mainly through the Central Applications Office (CAO) system, increasing numbers are entering from linked programmes where students obtain credit for work done in their previous programme. There are also increasing numbers of certificate, diploma and taught master’s programmes, as the focus on life long learning increases. In addition there is increasing mobility of students across Europe and this is strongly supported by the European Union (EU) ERASMUS Programme.

E-Learning is also becoming important as a training tool for extension services. The University of Wisconsin is particularly active in this regard as is Teagasc, (Irish Extension Service). Teagasc and the Health and Safety Authority in Ireland have recently released a training pack containing a CD on farm safety, which is being used by the extension service as part of its training programme for farmers in the area of farm safety (Health and Safety Authority [HSA], 2006).

Purpose and Objectives

The purpose of this paper is to outline recent development in eLearning in Ireland. This will be done through: a) reviewing the changing environment in
which university education operates and in particular the development of eLearning; b) presenting and discussing a case study of a blended learning programme developed and delivered in partnership by four Irish universities; c) presenting results of an evaluation of one of the major modules in the programme, which incorporated the most recent developments; and finally d) drawing conclusions about the contribution of blended learning systems for universities and extension services.

**Methodology**

The research incorporates a mixed methodology incorporating components of both quantitative and qualitative approaches. It draws on a significant body of literature in the area of curriculum development and eLearning. It uses documentary evidence provided by examination results, external examiner’s reports and minutes of meetings and personal observations. It also uses action research principles where one piece of research informs the next. The use of mixed methods is increasing in popularity; according to Cresswell (2003), mixed methods research, “employing the data collection with both forms of data, is expanding” (p. 208). The fact that research is not always a clear line from A to B but builds on information collected in different ways over time is also supported by Bechhofer (1974). “The research process is not a clear-cut sequence of procedures following a neat pattern but a messy interaction between the conceptual and empirical world, deduction and induction occurring at the same time” (Bechhofer, p. 73).

**Theories of Learning**

While significant changes have occurred in universities, teaching is influenced by past experiences (Delaney & Mitchell 2005). Bloom’s taxonomy has long been used as a guiding influence in educational development. The competences to be developed are: knowledge, understanding, application, analysis, synthesis, and evaluation (Bloom, 1956).

![Bloom's Taxonomy of Educational Objectives](image)

**Figure 1. Bloom’s Taxonomy of Educational Objectives**

Later, the Affective and Psychomotor domains were added. Similar type models were developed by Chickering and Gamson (1987) and by Fleming (1987) with these latter models focussing more on feedback. Traditionally Blooms taxonomy and its derivatives were used in a top down manner, with little participative involvement in the development of curricula. While Bloom’s taxonomy and its additions are still very relevant today, modern curricula are more student-centred and focus more on learning.
outcomes. Romiszowski (as cited in Gibson, 2005, p. 29), suggested that when focussing on learning outcomes, four broad areas of skills development should guide the process. These are: 1) cognitive; 2) psychomotor; 3) reactive; and 4) interactive. Learning outcomes are clear statements of what the student will be able to do after completing the learning activity. A focus on learning outcomes should help the teacher or tutor to select the most appropriate learning activity. Learning outcomes focus on knowledge, cognitive skills, subject specific skills and transferable skills. This approach has in many ways been driven by the Bologna process (Bologna Process, 2005), which seeks to harmonise curricula design across Europe, in order to create greater transfer of students. It is also driven by a greater focus on “employability” of students emerging from the educational process. In addition, the focus on learning outcomes provides a better framework for the evaluation of courses, as learning outcomes are more easily assessed than learning objectives.

Considerable philosophical change has also occurred in approaches to teaching and learning. The learning system of the past has been characterised as a teacher centred top down learning system. Today there is a significant move from traditional lecturing to approaches that are much more student centred (Barr & Tagg, 1995). These include enquiry based learning (Kahn & O’Rourke, 2005), action learning (McGill & Beaty, 1995), problem based learning (Barrett, 2005; Barrows & Tamlyn, 1980), and experiential learning (Brooks, 1995; Kolb, 1985).

**Evolution of Distance/E-Learning**

The term distance learning has been applied to a great variety of learning situations (Delaney & Mitchell 2005; Perraton, 1988; Peters 2001). In analysing the evolution of distance learning one can classify it into four phases/generations. These phases are an expansion of that presented by Dede (1996) and the three forms presented by Valentine (2002). They also draw on articles related to retention by Rovai (2003) and Herbert (2006). The first type of distance learning (Generation 1) was in the format of correspondence courses. Here the main focus was on providing learners with text, which they could study at home. However, studying alone can be a very lonely experience and only the highly motivated succeed. Thus the early years were characterised by significant drop out as the systems were not able to create favourable conditions except for the most ardent learners. Distance learning received a significant boost with the founding of The Open University in the United Kingdom in the 1960’s in the belief that it could, using modern communications, create greater access to education. This institution has continued to embrace new technologies and is now a very significant supplier of adult learning courses. It also provides a framework for public private partnerships in the delivery and accreditation of learning.

The next generation (Generation 2) saw the introduction of television and videocassettes to complement the written word. However, very often one found that academics who were expert in the subject matter area were not the best communicators. In addition early systems provided little opportunity for feed-back leaving the learner isolated. The material was also very often not user friendly and again only the most ardent persisted to the end. Videocassettes were also costly to produce and very quickly became outdated. Similar to correspondence courses, there was little opportunity for feedback and learning remained largely a top down process.

Generation 3 with the advent of the computer began to show real opportunities for distance education. However, it also introduced a new set of learning experiences for students i.e., that of learning the new technology as well as the subject matter. Almost all courses suffered from the lack of access to material, other than which was
provided directly as course materials and these were often not specifically prepared for electronic delivery. There was also a lack of critical mass and thus little or no opportunity for contact between learners. The main result was again a significant retention problem, with many students dropping out because of isolation and frustration with the technology.

**The New Era**

The greatest leap in the development of distance learning (Generation 4) has come with the advent of the World Wide Web. The developments in computer technology and the advent of the World Wide Web have created new and challenging opportunities for both traditional and distance learning education. This and the reduction in cost combined with the enhanced capacity of computers have meant that many homes now have access to computers. The *Wall Street Journal* of February 4, 2004 for example quoted that 54% of US adults use the Web on a regular basis, while 90% of 15-17 year olds are regular Web users. Data from Ireland (Amárach, 2004) shows that 46% of adults and 70% of 15-24 year olds use the Internet. Where computers are not in homes, they are available in schools, local training centres and more recently in rapidly expanding Internet cafés.

For educators, the Internet provides exciting new opportunities for teaching and learning. In contrast with traditional distance learning systems it provides an opportunity for feed back and brings to life the concept of the “virtual classroom.” The overriding advantage of distance learning is its ability to reach dispersed audiences. It is accessible at any time so students can learn at their pace. It reduces the workload on the lecturer, once the courses have been developed. It allows students the opportunity to explore a wide variety of knowledge and can link students to a catalogue of libraries as more and more articles are being published on the Web. Many agencies that collect statistics are making those statistics available on the Web. Students can contact each other via the Web, which can greatly increase collaboration between students thus negating the sense of isolation that many distance learning student’s experience.

Commercial companies have seen the opportunities for e-learning and there are now a number of well-developed learning platforms. Sherry (1996) discussed the need to combine technology with sound educational practices, while Saettler (1990) quoted in Sherry,

…found that the mental effort a learner will invest in learning depends on his or her perception of two factors: (1) the relevance of the medium and the message, which it contains; and (2) the ability of the learner to make something meaningful out of the material presented. (p. 341)

Inquiry learning, which is a critical component of what is involved in Web-based distance learning means that the teacher is no longer the “sage on the stage,” but is the facilitator of discovery learning. Phelan (2002) classified e-learning approaches into three categories/models:

1. Dumping model: Lecturers dump their traditional lecture notes or handouts on the Web, thus providing students with access. No effort is made to adapt them for electronic learning. It facilitates access, although some argue that it transfers the cost of photocopying to the student.

2. Home video model: Course materials are designed especially for e-learning. Efforts are made to incorporate sound pedagogic principles, thus it is learner centred. Efforts are made to use modern technologies; however, these are limited to what is locally available. Efforts are also made to use the “virtual classroom,” but due to lack of finance and support, the attractiveness of the material is limited.

3. Hollywood model: This model employs all the latest communication
technologies and expertise to make the materials and the system fully interactive. It first requires a content review and development to ensure that content delivery can take full advantage of the new technologies. It also requires intellectual and technical investment to ensure high quality learning methods as well as a framework to support the learner.

Phelan (2002) noted that first efforts with the new media were minimal and largely involved placing traditional lecture notes etc on the Web. This to some degree explains the slow take up of e-learning. He also notes that many institutions have moved beyond the dumping model and new courses are now beginning to be specifically written underpinned by modern learning theories and based on self learning principles, incorporating practical examples that link theory with practice and that provide a range of learning stimuli (text, audio, visual etc.). One of these examples are courses developed by v-Learn.ie (www.v-Learn.ie), a virtual learning centre of the National University of Ireland (NUI) involving a partnership of four universities in Ireland, UCD, Dublin, The National University of Ireland, Galway (NUIG), The National University of Ireland, Cork (NUIC), and The National University of Ireland Maynooth (NUIM).

Blended Learning - the V-learn Model

The constituent colleges of the National University of Ireland (NUI) have worked together over a ten-year period to create a Diploma and Degree in Rural Development underpinned by modern learning philosophies and using distance learning methodologies. The author was a core member of this group and acted as its chairperson for a period of six years. The development was informed by a LEONARDO supported pilot project, which evaluated the use of e-learning methodologies to deliver a short course in project management to participants in Ireland, Greece and the UK. The project used the Blackboard™ platform and the only physical contact with learners was a one-day introductory workshop. All other support was provided electronically. Of the 52 participants that registered, 23 received certificates. Lack of time, difficulty with accessing the course, and general technical difficulties were the main reasons for non-completion. The project was evaluated internally by the core partners, by the tutors, by the course participants and by an external evaluator. The conclusion was that e-learning represented a very real alternative to conventional learning methods, particularly for adult professional training (Phelan, 2001). All evaluators, however, stressed that the system had difficulties in terms of gaining access to blackboard online, moving through some areas of the course and use of the virtual classroom. However, these were viewed as problems that would quite quickly be solved, thus opening the way for e-learning.

The project evaluation provided a number of important pointers. Firstly the cost of developing top quality courses is very demanding in terms of academic and technical time and substantial investment is required to create good courses. Because of lack of mass in any one university, this demanding technical input can best be met through collaboration. Secondly, learners need support in terms of real contact with tutors and with one another. This enhances the learning process and provides the necessary body contact and support to retain learners. Supported with this knowledge and experiences gained from implementing a diploma the four NUI colleges agreed to collaboratively develop and deliver a BSc in Rural Development using a specifically designed e-learning model and the Blackboard™ platform. The first B.Sc. course was launched in 2004 and the model was developed diagrammatically in 2005.
The model is built around (a) development of a text document oriented towards distance/electronic learning; (b) development of a set of interactive slides with voice over as an additional learning tool; (c) provision of voice over in MP3 format, which can be played on car CD players or on MP3 players; (d) use of strategically placed tutors as learning facilitators for the learners; (e) encouragement of local learning cells; (f) a programme coordinator at each institution; and (g) an academic management team consisting of key academics from each institution.

Because of difficulty and slowness in using the Internet in some areas, all learning materials are made available through CD. The model developed is based on the “Blended Learning” principle (one that supports eLearning with face to face contact), which uses electronic methods, but also draws on good learning principles from more traditional teaching methods. The model also incorporates critical interactions as outlined by Laird (2003), learner-learner interaction; learner-tutor interaction; and learner-content interaction. The model is presented diagrammatically in Figure 2.

A key aspect of the model is contact with and between students. This contact is provided through the encouragement of local learning cells, where students learn together and through the provision of a tutoring system at the local level. Opportunities are provided for all students in an area to come together for a number of one-day seminars, which are provided throughout the year. The model fulfils three important principles put forward by Garrison, Anderson, and Archer (2000). These are that a learning model should display a “cognitive presence,” a “social presence,” and a “teaching presence.” The
cognitive presence and the teaching presence are supplied through using specifically developed e-learning texts supported by voice over PowerPoint type presentations, which incorporate video clips, animations, interactive learning objects and self correcting quizzes. The social presence is provided through an active tutoring system, the use of seminars and the use of projects, which encourage the formation of local learning cells that involve both a physical and electronic presence. A typical local learning cell would involve four to five people.

The model also fulfils the requirements of an effective learning environment as put forward by Bransford, Brown, and Cocking (1999). They state that an effective learning environment is learner centred, knowledge centred, assessment centred and community centred. There is a very strong sense of community within the programme. This is developed by having an open access system to tutors, lecturers and the core management team. It is also supported by seminars, which are attended by both staff and students. Thus the model strongly values interaction, the importance of which has been highlighted by many authors (Anderson, 2003; Wenger, 2001).

The model is referred to as a “blended learning” model as it incorporates both face to face and electronic contact. Blended learning according to Rovai and Jordan (2004) is a hybrid of classroom and online learning which creates a stronger sense of community than either traditional classroom learning or e-learning.

Of primary concern for any learning model is its effect on the learning process. There is considerable debate in the literature about the value of e-learning and regarding what actually contributes to improved outcomes, is it the technology or the content? One school of thought is that technology is only the vehicle (Clark, 1983; Schramm, 1997) and it is the improved content that is the main causal factor (Bonk & Reynolds, 1997). Several others have listed the advantages of online learning over traditional methods (Cole, 2000; Landau, 2001). In reality improved outcomes are probably a combination of both. The fact that students can learn at their own pace and are not time bound as well as the possibility of viewing lectures a number of times seems to present logical advantages. In addition, because universities are based in cities and many students live off campus, time saved travelling can be enormous, thus allowing more time for productive work. On the other hand e-learning content, when developed properly, presents coherent well-linked material, which often is not the case with traditional curricula.

Evaluating the Model

The evaluation was guided by the Kirkpatrick (1994) model and focussed on the first group of students that completed the entire programme. The first important point to note is that there was minimal dropout from the programme, much less than experienced with the earlier LEONARDO supported programme. A small number of people who were interested at the beginning did not pursue the programme, but of the 55 students who registered for the programme only two dropped out. These results are similar to that reported by Carr (2000), who states that online courses experience higher attrition rates than blended learning courses. Forty-six percent of students were aged between 41 and 50, while 24% were younger and 30% older. Sixty six percent stated that they were familiar with IT from their work experiences, while the remainder were not. Only 2% had completed a degree already, thus for the vast majority it was a return to education and their first venture into 3rd level.

A questionnaire was developed to evaluate Module 25. Module 25 was selected because it incorporated lessons learned from previous modules. It was also a substantial module (10 ECTS Credits) and was delivered half way through the final year of the programme. The questionnaire...
was developed using Survey Monkey.Com, an electronic survey platform and comprised of a combination of Likert type questions using a scale of one to five; yes/no questions and open ended comment questions. The questionnaire was reviewed by the academic core team and the tutors and was pilot tested before being sent online to the students. Fifty respondents completed the detailed online questionnaire. It is not the intention in this paper to comment on the entire evaluation but to select a number of aspects that were particularly relevant to the model.

Module 25 dealt with socio-economic research methods, as well as research approaches and encompassed components on statistics and SPSS, areas that students often find difficult. The module comprised of eight units with a comprehensive set of texts written specifically for each unit (248 pages in total). It also contained a series of PowerPoint slides, with voice over (120 slides), a list of reference material and operational guidelines. Figure 3 shows that very few students had difficulty in understanding the learning materials provided.

Forty-one students agreed or strongly agreed that the materials provided were clear, with only one disagreeing. As mentioned earlier a key principle of the V-learn model is to provide as many learning stimuli as possible. Module 25 used interactive clips, video clips and quizzes at the end of each unit. Students’ perceptions of these items as learning supports are presented in Figure 4. The first point that can be made is that all methods were rated highly by students. A critical outcome of the analysis is a clear recognition that students learn in different ways. Some for example rated the text very highly and relied on it as the main learning method, while others rated it more poorly in comparison to other methods.
The same in fact was found for all methods. It is also clear from Figure 4 that text, diagrams and the slides with voice over were the most highly rated learning methods. What was somewhat surprising was the value given to the text, but it does clearly show that a text prepared specifically for a topic, incorporating good pedagogic learning practices specifically developed for electronic learning can be an extremely useful learning tool. On the other hand, it was somewhat surprising that the self-correcting quiz received the lowest rating as this was developed as a summary mechanism for each unit and as a means through which students could self test their knowledge.

Finally students were asked if they felt hindered in any way through having to learn online and what they liked best and least about the module. Sikora and Carroll (2002) reported that “47% and 51% of undergraduate and graduate/first professionals respectively were less satisfied with online courses than with traditional methods” (p. 23). In this survey, 29 students stated that they were in no way hindered by having to learn online, while 13 stated that they were. Most comments regarding what students liked best were related to content being relevant and well presented, however a number did mention the usefulness of mixed learning methods. Again the greatest dislikes also related to content and particularly unit seven, which dealt with quantitative data analysis. Other comments related to language and that some areas should be given greater depth. There were no criticisms of the methodology other than respondents wanting more time to complete the module, while some felt it might be better as two 5-credit modules rather than the 10-credit module which it was.

**Conclusion**

Distance learning has advanced significantly over the past 20 years and real alternatives to traditional learning systems are now beginning to emerge. High quality e-learning systems are expensive to develop and top quality systems can best be developed through institutional collaboration rather than each institution repeating the process. Well developed e-learning models can challenge traditional systems, while poorly developed systems contribute little to the learning process and are more likely to damage the reputations of institutions than enhance them. The Distance/e-learning model developed by the NUI universities provides real learning opportunities for distance students and for mainly campus-based students. It has overcome the major problem of many other
models i.e. that of significant student drop out. The local support networks and the tutors are critical factors in this regard (each 5 credit module received 6 hours of direct tutor support as well as electronic support). The incorporation of a number of different learning methods reinforces learning and is particularly important as different students learn in different ways. The preparation of material incorporating sound pedagogic principles and geared specifically to e-learning (as demonstrated by the evaluation of module 25) can achieve outcomes which are superior to traditional learning systems. The cost of delivering courses in this manner (once developed) is much lower than in traditional systems, while the advantages for the student in terms of flexibility of learning, access to materials and time saved in commuting are significant. The time is approaching when there are no logical reasons for totally campus-based courses. Internationally competitive universities will be those that invest in and support the e-learning process. They will also be the universities, which are in themselves big enough to support these developments or who through strategic partnerships can amass the necessary expertise and resources. Universities must also question their current investment strategies where investment in buildings and concrete is more important than investment in pedagogy and new methods. While universities will still need facilities, future demands may differ significantly from past and current experiences.

Universities are not the only institutions that need to embrace these new technologies. Extension education systems also need to be more aware of the possibilities of eLearning and blended learning as systems for educating adults. While some are very active in this area, many still rely on traditional methods. Similarly, Government Ministries that support education need to take cognisance of these changes and develop appropriate support systems for students, which are course based rather than campus based. The concept that students must be full-time on campus in order to qualify for financial supports is outdated. Courses nowadays are constructed based on learning outcomes and are less dependent on where and how they are delivered. More and more businesses are following the e-learning route. Universities should be leaders not laggards in this regard. This however, will not happen without significant financial support and without a real commitment to the development of e-learning both on and off campuses.

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Comparing Farmer Field Schools, Community Workshops, and Radio: Teaching Bolivian Farmers about Bacterial Wilt of Potato

Jeffery W. Bentley, Agricultural Anthropologist
PO Box 27-0116
Lima, Peru
E-mail: jefferywbentley@hotmail.com

Oscar Barea, PROINPA Foundation
Casilla 4285, Cochabamba, Bolivia
E-mail: o.barea@proinpa.org

Sylvie Priou, International Potato Center
Apartado 1558, Lima 12, Peru
E-mail: s.priou@cgiar.org

Hermeregildo Equise, PROINPA Foundation
Calle Perú 100, Sucre, Bolivia
E-mail: h.equise@proinpa.org

Graham Thiele, International Potato Center
Apartado 1558, Lima 12, Peru
E-mail: g.thiele@cgiar.org

Abstract

Bacterial wilt (Ralstonia solanacearum) is a serious disease of potato. It can be managed with cultural practices, but only if farmers understand the technologies, and the reasons behind them. Face-to-face extension methods, like farmer field school (FFS), can teach these messages to smallholders, but other methods may also be useful. This paper compares FFS with two less-costly methods: “community workshops” and radio, and presents follow up surveys of these three extension methods. Community workshops were almost as effective as FFS for teaching most ideas; radio spots were less effective, especially for ideas that require demonstration, but they reach a much larger audience. The three extension methods gave the most different results for time-consuming technologies, where a more compelling demonstration may convince farmers to adopt a task that adds work to an already busy day. Extension methods should be chosen for the particular context. The more complicated, tedious, and counter-intuitive a new technology is, the more important it may be to use a more intensive extension method and the less likely that a mass media will be successful.

Keywords: Bolivia, Brown Rot, Extension, Ralstonia solanacearum, Training

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**Introduction**

Many extension experts consider farmer field schools (FFS) an effective way to teach integrated pest management (IPM), especially in tropical countries (Carpenter, 2003; Gallagher, 2003; Groeneweg, Versteeg, & Chavez Tafur, 2004; Pretty, 2002; Ricker-Gilbert, 2005; Röling & Van de Fliert, 1994; Thiele, Braun, & Gandarillas 2005; Van de Fliert, 2003). FFS teaches farmers in small groups (about 25), who typically meet once a week for several hours to learn about the agro-ecosystem in the field, over a whole season—from seed (planting) to harvest (generally not including storage). FFS uses discovery-based learning; farmers find out for themselves the principles of IPM through observation and simple experiments (Davis, 2006; Pumisacho & Sherwood, 2005). Although FFS was first developed to teach insect pest control, it has since been used for many topics, including plant disease (Braun, Jiggins, Röling, Van den Berg, & Snijders, 2006). Others have adapted FFS to involve farmers in research (Nelson et al., 2001; Onduru, 2003; Ortiz, Garret, Heath, Orrego, & Nelson, 2004).

The earlier, entomological versions of FFS emphasized avoiding insecticides, to conserve natural enemies. Farmers compared sprayed and unsprayed rice plots side-by-side, observing how beneficial insects and spiders controlled insect pests in the insecticide-free “IPM” plot (Winarto, 2004). However, when FFS was adapted to teach disease management, fungicides were often needed (Pumisacho & Sherwood, 2002). Nepalese farmers were taught to manage Botrytis in chickpeas using a split plot, where one side had a disease-resistant crop variety, fungicide and a lower plant density (Pande et al., 2005). FFS for managing disease has been shown to help farmers raise yields. A study in Peru where late blight was the main limitation showed that FFS graduates had higher potato yields (mean 15.7 t/ha), than non-FFS farmers (mean 13.7 t/ha) (Zuger, 2004, cited in Ortiz et al., 2004).

Attention is often drawn to the higher quality of FFS. A study in China compared FFS with the T&V (teaching and visit) approach, and found that FFS farmers continued learning well after the training had finished, whereas the others did not (Mangan & Mangan, 1998). A study in Java showed that farmers learned much in FFS and experimented with new technology, but found it difficult to teach the concepts to their neighbors (Winarto, 2004).

An experience with cowpea FFS in Benin suggests that field school is costly and that mass media (e.g. radio) may be more cost-effective (Nathaniels, 2005; Norton, Rajotte, & Gapud, 1999). Other authors (Feder, Murgai, & Quizon, 2004a, 2004b; Rola, Jamias, & Quizon, 2002) compared Indonesian field school graduates with farmers who had not taken FFS. The two groups had similar rice yields, used similar amounts of pesticides, and there was little diffusion of information from trained farmers to others.

Farmers learn in an FFS, but perhaps cheaper methods could reach a larger audience at a lower cost. In Bangladesh, a visit from an extension agent was found to be more cost-effective for teaching IPM techniques than a farmer field school (Ricker-Gilbert, 2005). Radio can be used to reach even more people with an IPM message. There is a need to evaluate the cost-effectiveness of FFS, compared with other, less-expensive methods (Anandajayasekeram, Davis, & Workneh, 2007).

Radio’s lack of visual information limits its ability to show a new tool, or detailed symptoms of plant diseases. However, topics like planting dates, where to get clean seed, or the virtues of crop rotation can be discussed verbally, without pictures. Studies in Vietnam have shown that messages such as avoiding insecticide on rice for 40 days, to conserve natural enemies, can be transmitted by radio (Heong...
et al., 1998). But whatever radio’s limitations, it may cost 1000 times less than face-to-face extension, per person reached (Chapman, Blench, Kranjac-Berisaljevic’, & Zakariah, 2003; Ramírez & Quarry, 2004). A radio program that could share even a few key points with several million farmers might be a wiser use of money than an FFS that reached just 2% of the farming population.

**Purpose and Objectives**

This study was designed to test the relative effectiveness of three extension methods (FFS, workshops, radio) for teaching disease management to Bolivian smallholder farmers. To do so, the study took advantage of activities of the “Bacterial Wilt Project,” led by the International Potato Center (CIP) and implemented with PROINPA (Foundation for the Promotion of and Research on Andean Products).

During 2002-2003, as part of the Bacterial Wilt Project, extensionists from PROINPA trained farmers in over 30 communities in Chuquisaca, central Bolivia, on bacterial wilt (BW) of potato (also known as “brown rot”), caused by the bacterium *Ralstonia solanacearum*. BW was reputedly introduced to Bolivia in 1984 with infected seed following widespread loss of the potato crop due to very heavy rainfall resulting from El Niño. BW is a quarantine disease so the government of Bolivia refuses to certify as seed, potatoes from BW-endemic areas. BW causes tuber rot, can kill the whole plant before it even produces tubers and can persist for many seasons in a field after an initial infection.

Estimates of economic losses in Bolivia are up to $1000/ha or more in a single season, depending on yield loss (up to 80%) and potato prices (Barea et al., 2004b; Equise, Barea, & Alvarez, 2004). Because of its persistence over many seasons the cumulative economic loss is potentially very much greater. By 1996, bacterial wilt was present in over half of the potato fields in Chuquisaca and around Vallegrande, in Central Bolivia, affecting about 15,000 ha and 20,000 farm families respectively (Barea et al., 2004b; Equise et al., 2004). Seed production areas in Chuquisaca were quarantined for 12 years after the mid 1980s, and seed producers lost income as they were forced to sell seed as ware potato.

The disease is difficult to control in central Bolivia: much of the infection is latent (e.g. does not show symptoms), so farmers can easily confuse healthy and diseased seed potatoes. When infected seed from lower valleys is planted at high elevations, the low temperatures prevent the bacteria from multiplying enough to produce plant wilt, but the bacteria are still in the plant and hence in progeny tubers. Depending on the district, when seed lots were monitored with detection techniques (developed by CIP) 20 to 60% of symptomless tubers were found to be positive for BW (Priou, 2004).

The survey population is reasonably homogeneous. All are smallholder farmers, in old, stable communities (i.e. none were recently settled or migrants). They are native speakers of Spanish, although they live close to Quechua-speaking communities, and the local Spanish is influenced by Quechua (e.g. with many loanwords). They typically farm two to four hectares of land, divided into various fields. They plow steep hillsides with oxen, and grow many crops in an effort to be self-sufficient in as many food items as possible. All or nearly all households grow potatoes to eat and most also sell potatoes, which is an important cash crop.

BW Project staff trained people in 10 communities using FFS, but taught farmers in 20 others with a less intensive method we call “community workshops,” and reached about 70 communities in the project area (and a few others outside it) with radio messages. Before doing the study, the authors hypothesized that farmers would “learn more in an FFS than in a workshop, and more in a workshop than from the radio” (Bentley et al., 2003b, p. 1). We reasoned that FFS is more costly, so if either
of the other methods have comparable results, they may be more cost-effective than FFS.

**Methods**

The authors and other project staff prepared three sets of parallel extension training materials on BW: one set for FFS, one for community workshops, and one for radio. The extension methods were different, but the underlying extension messages were intended to be as similar as possible for all three methods covering the same five key topics:

1. **BW diagnosis** using the stem vascular flow test (or stem glass test). The test is done by holding vertically a 3-cm potato stem base section in a glass of clean water and observing the smoke-like milky threads exuding from the stem vessels, indicating BW infection (Bentley et al., 2003b).

2. **Means of BW spread** and sanitation measures to avoid it.

3. **Use of healthy seed and where to find it.**

4. **Crop rotation** and incorporation of manure to recover infested soil.

5. **Where the BW pathogen lives and survives** (including sources of inoculum and ecology).

The messages included bio-ecological principles and background knowledge that farmers must know if they are to adopt a new practice, as shown in Table 1.

### Table 1

**Outline of BW Topics Taught to Farmers in Three Extension Methods**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Key Ideas</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BW diagnosis</td>
<td>• When a plant has BW, one or more stems wilt and then the plant dies.</td>
<td>• Recognize BW in the field.</td>
</tr>
<tr>
<td></td>
<td>• When potato plants have received enough water, and wilt anyway, it can</td>
<td>• Do the vascular flow test to diagnose BW.</td>
</tr>
<tr>
<td></td>
<td>be due to BW or to fungal vascular diseases, insect damage or stem</td>
<td></td>
</tr>
<tr>
<td></td>
<td>wounding.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Using a vascular flow test to diagnose BW.</td>
<td></td>
</tr>
<tr>
<td>2. Means of BW spread</td>
<td>• BW spreads through seed, soil on tools, animals’ hooves and farmers’</td>
<td>• Rogue diseased plants and bury or burn</td>
</tr>
<tr>
<td></td>
<td>sands, bags, runoff and irrigation water.</td>
<td>them. Eventually put ashes or lime in</td>
</tr>
<tr>
<td></td>
<td>• BW is hard to eradicate from infested fields, so various sanitation</td>
<td>the hole.</td>
</tr>
<tr>
<td></td>
<td>measures should be applied to prevent contamination of BW-free plots.</td>
<td>• Wash tools, sandals and bags</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(preferably with a bleach solution)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>before entering field.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Dig drainage ditches; do not use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>irrigation water that crosses infested</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fields.</td>
</tr>
</tbody>
</table>
### Table 1 (continued)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Key Ideas</th>
<th>Recommendations</th>
</tr>
</thead>
</table>
| 3. Use of healthy seed | • Infected seed spreads BW to potato fields.  
• Recognizing BW symptoms in tubers.  
• There may be no visible symptoms, even in infected seed. The bacteria can be present in the tubers, but in a latent form. | • Recognize and use healthy seed.  
• Identify sources of BW-free seed e.g., from BW-free highland areas where farmers do not plant seed brought from lower elevations. |
| 4. Crop rotation | • Crop rotation or a long fallow reduces disease-causing bacteria in the soil.  
• Some crops are potential hosts and should not be planted after a BW-infested crop.  
• Rotation or fallow is effective only with the proper sanitation practices to prevent plot recontamination.  
• Hen manure helps reduce BW pathogen in soil and improves plant growth. | • After a BW-infected potato crop, collect rotten tubers at harvest and keep fields free of weeds and volunteer potato plants.  
• Rotate crops or fallow for at least two years before planting potatoes again. Rotate with crops that cannot host BW.  
• Plow hen manure into fields. |
| 5. Where the BW pathogen lives and survives | • BW is caused by bacteria: very small, living things that one cannot see, but which multiply rapidly.  
• BW develops from infected seed potato seed or the bacteria penetrate the roots from infested soil.  
• The bacteria that cause BW also live on roots of weeds and volunteer potato plants. The BW pathogen needs heat and moisture to multiply so BW develops less at higher, cooler altitudes leading to latent infection. | • Use healthy seed grown in the highlands.  
• Plow in the dry season to expose soil to sun or frost.  
• Keep fields free of weeds and volunteer potato plants. |

**Farmer Field School**

The participants included local leaders and other farmers, selected with the help of locally-elected, community leaders (*dirigentes*). Each FFS had a learning field: a potato field already infested with BW. So participants could see how healthy seed manages bacterial wilt, “a local farmer planted certified seed in half of the plot and local seed in the rest (the same rates of fertilizer and fungicides were used)” (Bentley et al., 2003b, p. 2). Every FFS session included an “agro-ecosystem analysis,” which is a structured comparison.
of the two halves of the plot, usually considered a central feature of FFS, involving field observation, drawing sketches, and discussion. The participants drew potato plants in the stage of growth they had seen in both halves of the plot and included their observations (e.g. diseases, insects, and weather) and then discussed how the environment and clean seed influenced plant health. Activities in the learning field were complemented by simple experiments where farmers infected seed in pots, and by talks and demonstrations. Farmers attended 10 sessions with about 25 participants in each field school (about 40% were women). The field schools were given by PROINPA staff who received intensive, on-the-job training and close supervision from a staff member (agronomist H. Equise) who had taken a three month practical course on FFS in Ecuador in 1999, organized by the FAO and CIP.

Workshops

The workshops shared some features with the FFS. They included an IPM focus, bio-ecological information, and a learning plot to show the importance of healthy seed. There were three main differences. First, the workshops were open to the whole community, not to a group of 25, and often 50 or 60 people attended. Second, workshops met less often only “three times per crop cycle, while the FFS met about ten times” (Bentley et al., 2003b, p. 2). Third, the workshops did not include an agroecosystem analysis. Partly this was to save time, which was one of the goals of the workshop; also the workshops were seen more as straightforward ways of disseminating technology, with less emphasis on class participation.

Radio Programs

The staff wrote six scripts of three minutes each, to convey the same agroecological information that was given in the FFS and workshops. As in the workshops and FFS, the radio programs emphasized cultural control (healthy seed, crop rotation, and sanitation practices). The short programs were written in vernacular Spanish by the same agronomists who carried out the FFS and workshops. Each message was read on the air three to four times a day by professional journalists at Radio Mauro Núñez, a community, non-profit station. After a month the next message was introduced (Bentley et al., 2003b, p. 4).

Costs and Audience

Because there were 10 FFS sessions but only three workshop sessions, and workshops had class sizes double or triple those of FFS, the per capita cost of a workshop was much less than that of a farmer field school. We conservatively estimate 2000 listeners to the radio program, based on the population of the villages (but not the towns) of the areas where the Radio Mauro Núñez broadcasts can be regularly received (Table 2).

Table 2

Costs of Different Extension Methods (including staff costs)

<table>
<thead>
<tr>
<th>Methods</th>
<th>Number of farmers reached</th>
<th>Total cost (in US dollars)</th>
<th>Cost per farmer (in US dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFS</td>
<td>318</td>
<td>24,170</td>
<td>76</td>
</tr>
<tr>
<td>Workshops</td>
<td>746</td>
<td>19,400</td>
<td>26</td>
</tr>
<tr>
<td>Radio</td>
<td>2000</td>
<td>840</td>
<td>0.42</td>
</tr>
</tbody>
</table>
Survey Methods

The research design had three treatments (i.e. FFS and radio vs. workshop and radio vs. only radio). These three extension methods were the categories for sampling interviewees. It is often difficult to interview a random sample of smallholder farmers in a developing country as there may not be a list of the population to construct a sampling frame; even if there is a list, many villagers are away from home on any given day. In Chuquisaca, the rugged, semi-arid topography meant that many houses were a kilometer apart over steep terrain—which added to the time and cost of reaching people. This forced us to take a quota sample (the people we could find, either at home or in their fields). In 2003, the authors administered a short questionnaire to 55 farmers in nine communities (19 had attended an FFS, 18 had gone to a Workshop, and 18 had listened to the radio programs) (Bentley et al., 2003a).

The results of the 2003 questionnaire suggested that there were differences between the treatments, but that farmers in all three groups learned something (Bentley et al., 2003a). In 2004 the authors and other colleagues conducted a survey of a larger sample of 173 farmers (59 from FFS, 79 from workshop, and 35 from radio) (Barea, Salinas, Rioja, Equise, & Quiruchi, 2004a). The 2003 study emphasized knowledge (what people had learned about BW), while the 2004 questionnaire stressed behavior (how people controlled BW). The timing of the surveys made sense, because by 2004 farmers had had more time to try the new practices. All of the data presented in Tables 3-10 is from the 2004 survey. Data were analyzed using a chi-square test of homogeneity of proportions.

Communities were chosen that had had little previous extension contact with PROINPA (e.g. no previous FFS had been done there). Communities were purposively chosen to include contrasting agroecological zones, and there was a tendency for the FFS communities to be in higher-altitude, seed-producing areas, with more concern about BW and possibly more contact with extension, but not necessarily from PROINPA. Because many agencies in Bolivia perceived bacterial wilt as a national emergency, from the mid 1980s on, several NGOs, government agencies, and a prominent seed project (PROSEMPA) taught about BW in the area. The seed-producing communities were more motivated to pay attention to these messages. Our samples may have been biased, with “progressive” farmers over-represented in the FFS compared to the other groups (see Feder et al., 2004a). If anything, this would be expected to lead to an upward bias in the impact of FFS compared to other extension methods but we do not believe that this effect was very large. As far as we can judge there are no systematic biases, which would have produced the pattern of differences between the three survey groups, except the possible over-sampling of more progressive farmers in the FFS group.

This study does not have an absolute control group, i.e. we have no group of interviewees without exposure to any media. This is an inherent problem with studies of radio, which blankets a large area. During the first survey, all but one person (in all groups) said they had heard the messages over the radio, and many of them repeated the messages for the interviewers. So all (or almost all) of the farmers learned something from the radio and extension programs, but people (in all three treatments) probably also learned something from other sources.

Results

Topic 1: Diagnosing BW

During the first survey, most interviewees “could describe at least some of the symptoms of diseased plants and tubers and explain the symptoms of bacterial wilt in their own words” (Bentley et al., 2003b, p. 6). This was not surprising, since they had had serious problems with the
disease for over ten years. Our training taught them to use the flow test to diagnose BW. Among the FFS graduates and workshop attendees, many farmers did not use the vascular flow test, although most of those who did not were familiar with the test (Table 3). Similar results were found during the 2003 study (Bentley et al., 2003a). FFS graduates were not more likely to do the flow test than those who attended the workshops, but FFS and workshops attendees used it more than people who only listened to the radio ($\chi^2[2, N = 49$ for FFS, 65 for Workshop, and 35 for Radio] = 20.462, $p < .001$; Table 3).

The reasons people gave for using the flow test were significantly different among all three training methods. Most of the workshop attendees (and significantly more FFS graduates) knew the test, even if they had not used it ($\chi^2[2, N = 25$ for FFS, 44 for Workshop, and 34 for Radio] = 47.577, $p < .001$; Table 3).

Table 3

<table>
<thead>
<tr>
<th>Tried the Flow Test at Least Once</th>
<th>FFS</th>
<th>Workshop</th>
<th>Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes$^a$</td>
<td>24 (41%)</td>
<td>21 (27%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>No, even though they saw wilted plants in their field$^a$</td>
<td>25 (42%)</td>
<td>44 (55%)</td>
<td>34 (97%)</td>
</tr>
<tr>
<td>Because they do not know it$^b$</td>
<td>4 (16%)</td>
<td>17 (39%)</td>
<td>34 (100%)</td>
</tr>
<tr>
<td>Because of other reasons$^b$ (lack of interest, time or did not have a clear drinking glass)</td>
<td>21 (84%)</td>
<td>27 (61%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>No, because they did not see wilted plants in their field</td>
<td>10 (17%)</td>
<td>14 (18%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Note. Percentages in the same row that do not share same sub-scripts differ at $p < .05$ in the chi-square test of homogeneity of proportions.

$^a\chi^2 (2, N = 49$ for FFS, 65 for Workshop, and 35 for Radio) = 20.462, $p < .001$.

$^b\chi^2 (2, N = 25$ for FFS, 44 for Workshop, and 34 for Radio) = 47.577, $p < .001$.

**Topic 2: Crop Sanitation Practices**

FFS graduates were no more likely than workshop graduates to pull up (rogue) diseased plants, and remove them from the field. But radio listeners were much less likely to do so ($\chi^2[2, N = 45$ for FFS, 67 for Workshop, and 30 for Radio] = 11.887, $p = .003$; Table 4). However, FFS was more likely to convince farmers to adopt a more complex behavioral change: not just culling diseased plants, but also adding a soil amendment to the hole. Differences were highly significant between all groups, with FFS graduates the most likely and radio listeners the least likely to put lime, ash or manure in the hole after uprooting the potato plant ($\chi^2[2, N = 42$ for FFS, 57 for Workshop, and 19 for Radio] = 14.301, $p = .001$; Table 4).
Table 4

Farmers’ Practices for Wilting Potato Plants

<table>
<thead>
<tr>
<th>Rogued (culled) Diseased Plants</th>
<th>FFS</th>
<th>Workshop</th>
<th>Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes(^a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without soil spot treatment(^b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With soil spot treatment(^bc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No although they saw wilted plants in their field(^a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No because they did not see wilted plants in their field</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Percentages in the same row that do not share same sub-scripts differ at \(p < .05\) in the chi-square test of homogeneity of proportions.

\(^a\)\(\chi^2 (2, N = 45 \text{ for FFS}, 67 \text{ for Workshop, and } 30 \text{ for Radio}) = 11.887, p = .003.\)

\(^b\)\(\chi^2 (2, N = 42 \text{ for FFS}, 57 \text{ for Workshop, and } 19 \text{ for Radio}) = 14.301, p = .001.\)

\(^c\)Applied ashes, manure, lime in the hole left after plant removal or burned soil.

Table 5

Farmers Who Washed Tools before Entering the Field to Avoid Transmitting BW

<table>
<thead>
<tr>
<th>Washed Tools before Entering the Field</th>
<th>FFS</th>
<th>Workshop</th>
<th>Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes(^a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only with water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With water and other product (soap, bleach, stove ashes or lime)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No(^a)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Percentages in the same row that do not share same sub-scripts differ at \(p < .05\) in the chi-square test of homogeneity of proportions.

\(^a\)\(\chi^2 (2, N = 59 \text{ for FFS}, 79 \text{ for Workshop, and } 35 \text{ for Radio}) = 44.758, p < .001; \text{ Table 5}.\)

Topic 3: Use of Healthy Seed

Most farmers “understood that infected seed is the main source of BW, even those who had only listened to the radio” (2003 survey, Bentley et al., 2003b, p. 5). FFS graduates and workshop farmers were both more likely to actually use healthy seed than radio listeners. As Table 6 shows, most farmers claimed to use healthy seed, which for them included first and second generation certified seed, and other seed known to be disease-free (e.g. seed they brought from highland fields which they knew to be healthy). The differences were only slightly significant between radio and the other treatments, but not between FFS and workshops \((\chi^2 [2, N = 59 \text{ for FFS}, 79 \text{ for Workshop, and } 35 \text{ for Radio}] = 6.32, p = .042; \text{ Table 6}).\)
Table 6

Farmers Who Planted Healthy Seed

<table>
<thead>
<tr>
<th>Planted Healthy Seed</th>
<th>FFS</th>
<th>Workshop</th>
<th>Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>51 (86%)ₐ</td>
<td>65 (82%)ₐ</td>
<td>23 (66%)ᵦ</td>
</tr>
<tr>
<td>No</td>
<td>8 (14%)ₐ</td>
<td>14 (18%)ₐ</td>
<td>12 (34%)ᵦ</td>
</tr>
</tbody>
</table>

Note. Percentages in the same row that do not share same sub-scripts differ at \( p < .05 \) in the chi-square test of homogeneity of proportions. 

\( \chi^2 (2, N = 59 \text{ for FFS, 79 for Workshop, and 35 for Radio}) = 6.32, p = .042. \)

Topic 4: Crop Rotation and Incorporation of Manure

Almost all farmers rotate for at least one season after a potato crop, so the training method had no influence on this practice (\( \chi^2 [2, N = 59 \text{ for FFS, 79 for Workshop, and 35 for Radio}] = 0.735, p = .692; \text{Table 7}. \)). However, FFS graduates were significantly more likely than workshop attendees or radio listeners to know that crop rotation would also reduce disease, differences between workshop and radio were not significant (\( \chi^2 [2, N = 57 \text{ for FFS, 77 for Workshop, and 33 for Radio}] = 11.702, p = .003; \text{Table 7}). \)

Table 7

Farmers Who Applied Crop Rotation to Manage Diseases and Pests

<table>
<thead>
<tr>
<th>Rotated Crops</th>
<th>FFS</th>
<th>Workshop</th>
<th>Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>57 (97%)</td>
<td>77 (97%)</td>
<td>33 (94%)</td>
</tr>
<tr>
<td>Knew that it would reduce diseases and pests in soil ₐ</td>
<td>53 (93%)ₐ</td>
<td>53 (69%)ᵦ</td>
<td>24 (73%)ᵦ</td>
</tr>
<tr>
<td>Did not know it would reduce diseases and pests in soil ₐ</td>
<td>4 (7%)ₐ</td>
<td>24 (31%)ᵦ</td>
<td>9 (27%)ᵦ</td>
</tr>
<tr>
<td>No</td>
<td>2 (3%)</td>
<td>2 (3%)</td>
<td>2 (6%)</td>
</tr>
</tbody>
</table>

Note. Percentages in the same row that do not share same sub-scripts differ at \( p < .05 \) in the chi-square test of homogeneity of proportions. 

\( \chi^2 (2, N = 57 \text{ for FFS, 77 for Workshop, and 33 for Radio}) = 11.702, p = .003. \)

Method of training had little influence on the use of hen manure, and the differences were not significant (\( \chi^2 [2, N = 59 \text{ for FFS, 79 for Workshop, and 35 for Radio}] = 0.844, p = .656; \text{Table 8}). A few farmers from FFS and workshop said they used manure to control BW, although most used it to fertilize the soil (for which it is well suited, of course).
Table 8

**Farmers Who Used Hen Manure**

<table>
<thead>
<tr>
<th>Used Hen Manure</th>
<th>FFS</th>
<th>Workshop</th>
<th>Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes&lt;sup&gt;a&lt;/sup&gt;</td>
<td>16 (27%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>26 (33%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>9 (26%)&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Used manure to increase yields, or to fertilize the soil</td>
<td>13 (81%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>24 (92%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>9 (100%)&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Used manure to control BW</td>
<td>3 (19%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>2 (8%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>0 (0%)&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>No&lt;sup&gt;a&lt;/sup&gt;</td>
<td>43 (73%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>53 (67%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>26 (74%)&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

**Note.** Percentages in the same row that do not share same sub-scripts differ at $p < .05$ in the chi-square test of homogeneity of proportions.

$\chi^2 (2, N = 59$ for FFS, 79 for Workshop, and 35 for Radio) = 0.844, $p = .656$.

**Topic 5: Where the Pathogen Lives and Survives**

Farmers who took the FFS were significantly more likely than the workshop attendees or radio audience to plow in the cold season in order to turn over the soil and expose the bacteria to frost ($\chi^2 [2, N = 59$ for FFS, 79 for Workshop, and 35 for Radio] = 10.573, $p = .005$; Table 9).

Table 9

**Farmers Who Plowed Soil During the Dry Season to Expose it to Frost**

<table>
<thead>
<tr>
<th>Plowed in the Dry Season</th>
<th>FFS</th>
<th>Workshop</th>
<th>Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes&lt;sup&gt;a&lt;/sup&gt; to manage BW and/or pests&lt;sup&gt;a&lt;/sup&gt;</td>
<td>46 (78%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>47 (60%)&lt;sub&gt;b&lt;/sub&gt;</td>
<td>16 (46%)&lt;sub&gt;b&lt;/sub&gt;</td>
</tr>
<tr>
<td>Did not do it or did not know it&lt;sup&gt;a&lt;/sup&gt;</td>
<td>13 (22%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>32 (40%)&lt;sub&gt;b&lt;/sub&gt;</td>
<td>19 (54%)&lt;sub&gt;b&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

**Note.** Percentages in the same row that do not share same sub-scripts differ at $p < .05$ in the chi-square test of homogeneity of proportions.

$\chi^2 (2, N = 59$ for FFS, 79 for Workshop, and 35 for Radio) = 10.573, $p = .005$.

**Sharing Information with Other Farmers**

FFS graduates were not more likely than workshop attendees to share information with friends and neighbors, and radio listeners were significantly less likely than the others to share new ideas about BW with other farmers ($\chi^2 [2, N = 59$ for FFS, 79 for Workshop, and 35 for Radio] = 18.427, $p < 0.001$; Table 10).

Table 10

**Farmers Who Shared Knowledge with Other Community Members**

<table>
<thead>
<tr>
<th>Shared Knowledge</th>
<th>FFS</th>
<th>Workshop</th>
<th>Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes&lt;sup&gt;a&lt;/sup&gt;</td>
<td>34 (58%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>52 (66%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>8 (23%)&lt;sub&gt;b&lt;/sub&gt;</td>
</tr>
<tr>
<td>No&lt;sup&gt;a&lt;/sup&gt;</td>
<td>25 (42%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>27 (34%)&lt;sub&gt;a&lt;/sub&gt;</td>
<td>27 (77%)&lt;sub&gt;b&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

**Note.** Percentages in the same row that do not share same sub-scripts differ at $p < .05$ in the chi-square test of homogeneity of proportions.

$\chi^2 (2, N = 59$ for FFS, 79 for Workshop, and 35 for Radio) = 18.427, $p < 0.001$. 

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Conclusion and Implications

Conclusions

The general tendency was for FFS graduates to have learned more than workshop attendees, and much more than radio listeners. But results varied among different practices, and the difference was greatest for time-consuming technologies, where a more compelling demonstration may convince farmers to adopt a task that adds work to an already busy day. Adoption of new behavior was also uneven, and was influenced in part by confounding variables not in the research design (e.g. the cost of the technology).

Topic 1: diagnosing BW. The flow test was used by only 30-40% farmers for the two more intensive training methods. The test requires a clear drinking-glass and crystal clean water, both of which are in short supply in rural Chuquisaca. During open ended questioning in the interviews, some farmers explained that they did not need to do the test to distinguish drought from BW, because if they had irrigated, they knew their potatoes were not dying from drought. They also knew that BW infects individual plants, while drought affects whole fields. They also said that they uprooted diseased plants and examined the roots, to see if they were eaten by insects or rotted by other soil-borne diseases.

Topic 2: crop sanitation practices. Pulling up diseased plants reduces the spread of bacterial wilt, and also reduces inoculum in the soil; this practice was recommended for small field area (e.g. below 0.5 ha or even smaller) prevalent in the project area and with BW incidence less than 5%. However, most farmers are only willing to rogue 100 to 150 plants per plot (eight hours of work). When many plants are infected, farmers become discouraged from uprooting them all (Salinas, Villavicencio, & Barea, 2004). Still, FFS and the workshop participants did uproot plants, and FFS graduates were more likely to apply a soil amendment to the hole to kill the pathogen in soil. The bactericide effect of lime and stove ashes in soil had been demonstrated in greenhouse experiments at CIP (Priou, 2004).

Radio listeners had heard of washing implements, and mentioned it as one of the things they had heard on the radio during the survey. The idea impressed them (and a few even thought it was funny, i.e. counter-intuitive), but hardly any adopted the practice, while people who took FFS or workshops reported some adoption. The training convinced them that cleaning tools helped to avoid spreading soil-borne diseases.

Topic 3: use of healthy seed. Method of training had little effect on this behavior. Even if farmers understand the importance of healthy seed, purchase is constrained by high costs. Potato seed can cost about 40% of the crop budget. About 30% of the farmers in the study area say they cannot afford healthy potato seed (Salinas et al., 2004).

Topic 4: crop rotation and incorporation of manure. Using crop rotation for IPM depends on having land available. A BW Project survey in 2003 found that farmers with less than 1.9 hectares rotate for just two years, while those with two to 2.9 hectares of cropland (27% of the sample) rotate for an average of three years; 64% of farmers with over three hectares rotate for four years (Salinas et al., 2004). Crop rotation is a conventional practice in the area, and most farmers use it, depending on how much land they have, so well over 90% of farmers rotate crops, regardless of extension method.

Applying manure has consistently shown the suppression of various soil-borne diseases. Sterilized manure generally does not suppress disease, so the mechanism may be biological, although the exact antagonistic micro-organisms that suppress disease are poorly known (Noble & Coventry, 2005). Studies, as part of this project, also showed significant suppression of BW and yields were dramatically increased (double that of the control group),
with 20 t/ha of hen manure (Barea, Equise, Montenegro, & Sardán, 2004c; Priou, 2004). However, small and medium farmers can rarely afford to buy much manure. Farmers may be more likely to use manure to increase yields than to manage disease. Therefore, there was little effect of training on whether or not farmers applied manure. They seem to have done so if they could afford to buy manure, in order to fertilize their soil, rather than to manage disease.

**Topic 5: where the pathogen lives and survives.** The more intensive the training, the more likely farmers were to make the extra effort to plow the hard, winter ground, to expose the pathogen to frost and UV light, thus reducing soil populations. Plowing with oxen is strenuous work (especially when the soil is hard and dry) and the ox team often has to be rented. Those who did not plow in the cold, dry season argued that the soil was too hard then, or that they had no time.

**Implications**

*Sharing information.* FFS graduates were not more likely to pass on new ideas about managing disease than workshop attendees, a result that is consistent with earlier studies cited above (Anandajayasekeram et al., 2007; Feder et al., 2004a, 2004b; Rola et al., 2002; Winarto, 2004).

*Change in behavior.* The hypothesis guiding this research was that the FFS treatment should lead to the most learning and adoption of new technology. This hypothesis was broadly confirmed, although the degree of change varied with each practice. The biggest differences in adoption rates between extension methods were for washing tools and for time-consuming behaviors (dry season plowing, applying a soil amendment after rouging diseased plants), where a more compelling demonstration may convince farmers to adopt a task that adds work to an already busy day. But the 10 sessions of FFS were little better than three sessions of community workshop for encouraging people to adopt other technologies (e.g., using the flow test, rouging diseased plants or buying healthy seed) and workshop can reach more farmers at a lower cost.

All of the BW-management technologies demand that farmers spend money or labor, or both, so some people may decide that the expense is not worth the savings in disease reduction, even if they understand the technology and its rationale. This study did show that face-to-face extension (either FFS or workshop) is more convincing than radio. But the effect of radio on its own may have been underestimated in this study, because all of the farmers heard the radio spots, including the people in field schools and workshops. Hearing the radio spots may have reinforced some messages, or given them added credibility, giving the face-to-face methods a slight advantage in this study. But even the radio listeners adopted at least some of the recommended practices. Recall that it cost three times as much per capita to deliver a field school as to give a workshop. Radio is at least 100 times cheaper per person than an FFS.

Care should be taken in generalizing our findings. We compared three extension methods for only one problem (BW) and for adoption of a few technologies. Future research could compare themes such as long-term learning (retention), permanent technical change and empowerment. Future studies should also compare yields of FFS and non-FFS farmers (as in Ortiz et al., 2004).

Because it costs orders of magnitude less to reach a person by radio than by FFS, future studies should determine which messages can be conveyed by radio (or videos, newspaper etc.). The more complicated, tedious, and counter-intuitive a new technology is, the more important it probably will be to use a more intimate extension method, and the less likely a mass media will be successful.
Taking a broader perspective, however, FFS, radio and workshops should be seen as complements, not as alternatives in a broader integrated extension program. FFS could be useful for starting collegial research to improve management of a target crop or problem (see Biggs, 1989), developing key extension messages with farmers’ involvement and understanding how to communicate these messages most appropriately. This could be followed up with use of radio and workshops to disseminate key extension messages more widely. FFS and radio could be combined, using FFS communities as “radio studios” where farmers discuss what they learned in field school, with their words broadcast to thousands of their peers (Bentley & Van Mele, 2005).

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References


Explanatory Factors for Supervision Effectiveness of Senior Secondary School Heads of Agriculture Departments in Botswana

Barnabas M. Dlamini  
Department of Agricultural Education and Extension  
Faculty of Agriculture, University of Swaziland  
P.O. Box Luyengo, Luyengo, Swaziland  
E-mail: bmd@africaonline.co.cz

Didimalang F. Mmemo  
P.O. Box 10270, Palapye, Botswana  
E-mail: d_mmemo@yahoo.com

Abstract  
A descriptive correlational research was designed to identify factors perceived to explain supervision effectiveness of senior secondary school heads of agriculture department in Botswana. A valid and reliable instrument was used to collect data. Findings revealed that, heads of agriculture department were effective in their supervisory roles. Variables that explained supervision effectiveness were adequacy of supervision time, interpersonal qualities possessed, work experience, amount of time spent in other engagements, and amount of time spent teaching. The conclusions drawn from findings of the study were that, adequate time of supervision is important for heads of agriculture department to perform their supervisory roles effectively, and heads of agriculture department value supervision, and therefore, need little supervision from school heads to perform their supervisory roles. The teaching service management in Botswana should consider reducing teaching time for heads of agriculture department to afford heads of agriculture department more time to focus on supervision tasks.

Keywords: Adequacy of Time, Heads of Agriculture Department, Supervision Effectiveness, Supervisory Roles

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Introduction and Conceptual Framework

Supervision is viewed as the phase of administration, which focuses primarily upon the achievement of the appropriate instructional expectations of educational systems and is concerned with efficient and proper management of personnel (Eye, Netzer, & Krey, 1971). Drysdale and Mulford (2005) further described supervision as the ability to effectively guide and evaluate the job performance of the workers. Botswana senior secondary schools face challenges in effective supervision due to increase in number of students and teachers. In the early development of formal education, school heads could manage schools with ease. However, the drastic increase in number of students and teachers in recent years stretched the school head management capabilities. Thus, the Ministry of Education in Botswana decided to overhaul the leadership structure in schools. The purpose was to improve supervision effectiveness, by introducing position of head of department to oversee different groups of subjects in schools (Ministry of Education, 1994).

The heads of agriculture department are expected to co-ordinate work of the department, and organize in-service training for teachers. There are also to guide and counsel teachers, organize mock examinations, evaluate teacher performance, keep records, ensure time management in the department, and conduct departmental meetings (Teaching Service Management Guidelines, 2000).

Several studies have examined duties of supervisors in schools and the need for effective supervision. Koko (1998) found that effective supervision is measured by the ability to effectively prepare and train staff on the job. Staff development should be the concern of supervisors, to keep teachers abreast with the latest technologies. Keregero and Mthupha (1997) concluded that supervisors should motivate staff, recognize the success of teachers, and provide positive reinforcement. Thus, supervisors should understand the principles of motivation and use them accordingly.

Marland (1971) reported that supervisors should provide teachers with finances, books, equipment to ensure student effective learning. Myeni (2000) reported that, failure to supervise could lead to decline in teachers’ commitment, morale and productivity, and quality of student academic performance. Walker and Kitchel (2004) found that teachers were leaving the teaching profession, and this was related to job dissatisfaction and lack of support from supervisors.

Nkambule (1998) and Myeni (2000) found that supervision of the schools agriculture program in Swaziland was inadequate. Supervisors were inefficient in evaluating performance of teachers and did not provide feedback on their observations. In Ohio, Lindner (2001) found that supervisors were deficient in motivating employees, analyzing job performance of employees, appraising staff, counseling staff, and providing guidance to staff on how to plan. While in Zimbabwe, Chivore (1994) concluded that, both school heads and education officers were ineffective in discharging their supervisory roles. Nkambule also found that, supervisors lacked adequate time to discharge their supervisory roles. Malambe (2003) and Raunikar (1986) reported that supervisors had many responsibilities, which diminish their supervision effectiveness.

Campbell, Corbally, and Nystrand (1982) found that, time was a major constraint for administrators to perform their duties and suggested that supervisors should keep a log and keep track on their use of time and delegate some tasks to staff members. The literature suggests that supervisors need adequate time to be effective in their supervisory roles.

Interpersonal qualities of supervisors were also found to have a major influence in supervision effectiveness. Roberts (2006), Dlamini (1988), and Spector (1996) concluded that effective supervisors should be reliable,
resourceful, honest, patient, flexible, approachable, dependable, and innovative, and should possess ability to communicate. Roberts (2006) recommended that personal characteristics should be used as one of the basis for selecting cooperating teachers, who also perform supervisory work.

Dlamini (2004) found that the supervisory roles of heads of department “were positively associated with number of years in teaching, age, and number of years as head of department, number of teaching staff supervised, and length of service” (p. 51), prior to being in a supervisory role. Magagula (1993) found that teacher qualification and location of school had a significant influence on teacher commitment at work.

However, Nkambule (1998) found no significant differences between supervisors in urban and rural schools; and place where teacher was trained. McCracken, Smith, and Saundi (1984), Islam (1971), and Pajak and Blasé (1989) reported a high level of commitment among married agents than single agents. Nkambule (1998) found that years of teaching experience was a predictor of effective supervision. However, Obilade (1992) reported that, no significant difference was found between experienced supervisors and less experienced supervisors.

The conclusion drawn from the review of literature was that background and demographic variables data explaining supervision effectiveness were inconsistent. Thus, the need to explore more and assess the influence of background and demographic variables on supervision effectiveness by heads of agriculture department in Botswana. The review of literature on the main revealed only that supervisors were ineffective in conducting their supervisory roles.

The heads of agriculture department as professional leaders play a key role to superior performance of students in agriculture, and to the overall quality of the agriculture program in a school. However, the observation has been that the school administrators still attend to issues of students and teachers’ misconduct, which could be addressed by the heads of agriculture department. The heads of agriculture department have also been criticized for not conducting lesson observations and not organizing in-service training for teachers, and teachers have complained of lack of support from heads of department.

Since the inception of the heads of agriculture department position in the education system in Botswana senior secondary schools, no study has been conducted to determine explanatory variables for level of supervision effectiveness by heads of agriculture department in Botswana senior secondary schools, and thus, this study was designed and conducted.

**Purpose and Objectives**

The purpose of the study was to determine factors perceived to influence supervision effectiveness of senior secondary school heads of agriculture department in Botswana. The specific objectives of the study were to:

1. Describe the level of supervision effectiveness by heads of agriculture department;
2. Describe the adequacy of supervision time by heads of agriculture department;
3. Describe interpersonal qualities possessed by heads of agriculture department;
4. Describe the relationship between level of supervision effectiveness and independent variables; and
5. Identify explanatory variables for supervision effectiveness by heads of agriculture department.

**Research Hypothesis**

The research was based on the hypothesis that perceived increase in supervision time should explain more
variance on perceived supervision effectiveness by heads of agriculture department. Major, rival independent variables and the dependent variable are diagrammatically shown in Figure 1.

**Methodology**

The design of the study was *ex post facto*. Figure 1 shows the conceptual framework for the study. The target population of the study was all the heads of agriculture department (\(N = 27\)), all agriculture senior teachers (\(N = 27\)), and all deputy school heads (\(N = 27\)). The study was a census and sampling error was not a threat to external validity of the study. Frame error was controlled by obtaining up-to-date lists of all groups of respondents from the Ministry of Education. The lists were then purged, to avoid duplication of names, thus, controlling for selection error.

<table>
<thead>
<tr>
<th>Major independent variable (MIV): Perceived adequacy of supervision time</th>
<th>Dependent variable (DV): Perceived supervision effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rival independent variables (AIV): Interpersonal qualities, sex, age, highest educational level, college where highest level of education was awarded, took a supervision course at college/university, took a management course at college/university, took administration course at college/university, salary level, location of school, distance of residential home from school, marital status, number of years in teaching, work experience prior to current position, number of years in current position, mother in supervisory position, father in supervisory position, number of teachers supervised, number of support staff supervised, number of students enrolled in agriculture, number of teaching periods, length of teaching periods, amount of time spent planning for teaching, amount of time spent teaching, amount of time spent marking, amount of time spent supervising, amount of time spent in department meetings, amount of time spent in meetings with school head, amount of time spent in other engagements, number of committees served within the school, and number of committees served outside school.</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1.** Conceptual framework of the study.

A questionnaire was used to collect data, following suggestions by Dillman (1978). The questionnaire was divided into four parts. Part I assessed perceptions regarding the dependent variable, supervision effectiveness. Respondents were asked to indicate the level of supervision effectiveness by their head of agriculture department in performing their supervisory roles. The supervisory roles comprised 36 items grouped into ten clusters, namely, planning, communicating, evaluating teacher performance, motivating staff, organizing in-service training for teachers, record keeping, conducting meetings, directing work within the department, showing support to teachers, and time management. A six-point, summed rating scale was used to determine level of supervision effectiveness. The rating scale ranged from 1 (very ineffective), 2 (ineffective), 3 (slightly ineffective), 4 (slightly effective), 5 (effective), to 6 (very effective).

Part II contained items relating to the major independent variable, perceived adequacy of supervision time. Respondents were requested to indicate their perceived adequacy of supervision time by their head of agriculture department on 34 supervisory roles performed by heads of agriculture department. The supervisory roles were then grouped into nine clusters, namely, planning, communicating, evaluating teacher performance, motivating staff, organizing in-service training for teachers, record keeping, conducting meetings, and directing work in the department, and
showing support for teachers. Perceived adequacy of supervision time was measured using a six-point, summed rating scale. The rating scale ranged from 1 (very inadequate), 2 (inadequate), 3 (slightly inadequate), 4 (slightly adequate), 5 (adequate), to 6 (very adequate).

Part III listed interpersonal qualities. Respondents were asked to indicate their level of agreement of the interpersonal qualities possessed by their head of agriculture department. A six-point, summed rating scale was used. The rating scale ranged from 1 (strongly disagree), 2 (disagree), 3 (slightly disagree), 4 (slightly agree), 5 (agree), to 6 (strongly agree). Part IV consisted of the remaining rival independent variables, and the respondents were asked to fill or tick (√) their background and demographic variables.

The researchers established the face validity of the instrument and a panel of experts, consisting of three headmasters from Botswana senior secondary schools, two agricultural principal education officers; and, two lecturers in the department of Agricultural Education and Extension from the University of Swaziland reviewed and attested to the content validity of the instrument. A pilot test consisting of 30 teachers was conducted with teachers of home economics, art, design and technology, from Botswana senior secondary schools, and agriculture teachers from junior secondary schools not participating in the study. Cronbach’s alpha reliability coefficients for the domains were computed from the pilot test data, and coefficients ranged from .42 and .95. However, post-hoc reliability coefficients ranged from .72 to .97.

Prior to data collection, a research permit was sought and obtained from the Ministry of education to conduct the research in schools. Letters were then written to respondents to inform them of the research study, the purpose and objectives of the study, and the schedule for events, with specific dates for data collection. A self-administered questionnaire procedure was followed and used for data collection. The researchers hand-delivered questionnaires to the respondents. Each respondent was given a week to respond, after which, the researchers collected the filled questionnaire. Key holders were used as incentives. Miller and Smith (1983) suggestions were followed to control for non-response error. A 100% response rate was attained after a total of three visits to non-respondents.

The Statistical Package for Social Sciences (SPSS) version 10.0 for windows was used to compute data. Data were presented using descriptive statistics, correlations and multiple regressions. Descriptive statistics were used to describe background and demographic variables of respondents, the level of supervision effectiveness, and adequacy of supervision time. Correlations were used to describe relationships between the dependent variable, supervision effectiveness and the independent variables. Stepwise multiple regression analysis procedure was used to identify variables that explained and predicted supervision effectiveness.

Findings
About 72% of the respondents were males, and 63% were married. The mean age was 43 years (SD = 5.86) and 83% held the bachelor’s degree, with 54% trained within the country. About 59% of the respondents took a course in supervision, 70% reported to have taken a course on management, and 67% took a course in administration. The salary level of the respondents ranged between US$21 410 and US$23 638 per annum. A small number of the respondents or 6% and 11%, had mothers and father, respectively, in supervisory positions. About 70% of the respondents were teaching in rural schools. On average, respondents stayed about 5 km (SD = 17.60) away from school. On average, respondents had 19 years (SD = 5.23) teaching experience, had work experience of
11 years \((SD = 3.94)\) prior to current position, and have been in current position for 6 years \((SD = 4.57)\). Respondents had 14 teaching periods \((SD = 7.13)\) of 35 minutes \((SD = 9.55)\) long. Each head of department supervised on average 28 teachers and 4 support staff. The average number of students enrolled for agriculture classes for the 2006 calendar year was 875 per school. Respondents on average served in four committees within the school and two committees out of school. Heads of agriculture department in Botswana are experienced workers.

The first objective of the study was to describe level of supervision effectiveness by heads of agriculture department in Botswana senior secondary schools. Findings contained in Table 1 indicate that, respondents agreed that heads of agriculture department were effective in discharging their supervisory roles with an overall mean of 4.68 \((SD = .88)\). The supervisory role cluster that received the highest mean rating was communicating \((M = 4.92, SD = .94)\). Organizing in-service training for teachers was rated lowest \((M = 4.14, SD = 1.32)\). The heads of department tended to rate the supervisory roles higher than the deputy school heads or the agriculture senior teachers.

Table 1

*Perceptions of Respondents Regarding Supervision Effectiveness by Heads of Agriculture Department in Botswana*

<table>
<thead>
<tr>
<th>Supervisory roles</th>
<th>Deputy School Heads ((n = 27))</th>
<th>Heads of Agriculture Department ((n = 27))</th>
<th>Agriculture Senior Teachers ((n = 27))</th>
<th>Total ((N = 81))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(M) (SD)</td>
<td>(M) (SD)</td>
<td>(M) (SD)</td>
<td>(M) (SD)</td>
</tr>
<tr>
<td>Communicating</td>
<td>4.90 .89</td>
<td>5.21 .63</td>
<td>4.64 1.18</td>
<td>4.92 .94</td>
</tr>
<tr>
<td>Directing</td>
<td>4.88 .89</td>
<td>5.05 .54</td>
<td>4.69 1.16</td>
<td>4.87 .90</td>
</tr>
<tr>
<td>Time management</td>
<td>4.85 1.09</td>
<td>5.02 .69</td>
<td>4.74 1.33</td>
<td>4.87 1.04</td>
</tr>
<tr>
<td>Motivating teachers</td>
<td>4.96 .78</td>
<td>4.86 .83</td>
<td>4.63 1.08</td>
<td>4.82 .91</td>
</tr>
<tr>
<td>Conducting meetings</td>
<td>5.00 .87</td>
<td>4.94 1.14</td>
<td>4.49 1.63</td>
<td>4.81 1.26</td>
</tr>
<tr>
<td>Planning</td>
<td>4.90 .80</td>
<td>4.96 .75</td>
<td>4.24 1.40</td>
<td>4.70 1.07</td>
</tr>
<tr>
<td>Evaluating teachers</td>
<td>4.76 .88</td>
<td>4.87 .65</td>
<td>4.21 1.32</td>
<td>4.61 1.02</td>
</tr>
<tr>
<td>Supporting teachers</td>
<td>4.70 .96</td>
<td>4.93 .79</td>
<td>4.12 1.29</td>
<td>4.58 1.07</td>
</tr>
<tr>
<td>Record keeping</td>
<td>4.73 1.09</td>
<td>4.64 .94</td>
<td>4.27 1.25</td>
<td>4.55 1.10</td>
</tr>
<tr>
<td>Organizing in-service training</td>
<td>4.55 1.12</td>
<td>4.34 1.08</td>
<td>3.52 1.53</td>
<td>4.14 1.32</td>
</tr>
<tr>
<td>Total</td>
<td>4.82 .73</td>
<td>4.88 .56</td>
<td>4.33 1.16</td>
<td>4.68 .88</td>
</tr>
</tbody>
</table>

*Note. Rating scale: 1 = very ineffective, 2 = ineffective, 3 = slightly ineffective, 4 = slightly effective, 5 = effective, 6 = very effective."

The second objective of the study was to describe perceived level of adequacy of supervision time by heads of agriculture department. Findings presented in Table 2 reveal that, overall, respondents held the perception that the heads of department had adequate time to perform their supervisory roles \((M = 4.36, SD = 1.00)\). Conducting meetings received the highest mean rating \((M = 4.84, SD = .99)\) followed by motivating teachers \((M = 4.64, SD = 1.12)\), directing \((M = 4.62, SD = 1.05)\) and communicating \((M = 4.56, SD = 1.08)\). Organizing in-service
training for teachers received the lowest mean rating ($M = 3.83$, $SD = 1.35$).

Table 2

**Perceived Adequacy of Supervision Time by Heads of Agriculture Department**

<table>
<thead>
<tr>
<th>Supervisory roles</th>
<th>Deputy School Heads (n = 27)</th>
<th>Heads of agriculture Department (n = 27)</th>
<th>Agriculture Senior Teachers (n = 27)</th>
<th>Total (N = 81)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducting meetings</td>
<td>5.13 .82</td>
<td>4.67 1.02</td>
<td>4.72 1.08</td>
<td>4.84 .99</td>
</tr>
<tr>
<td>Motivating teachers</td>
<td>4.85 1.22</td>
<td>4.65 .90</td>
<td>4.41 1.22</td>
<td>4.64 1.12</td>
</tr>
<tr>
<td>Directing</td>
<td>4.73 .91</td>
<td>4.53 1.03</td>
<td>4.59 1.20</td>
<td>4.62 1.05</td>
</tr>
<tr>
<td>Communicating</td>
<td>4.65 1.15</td>
<td>4.69 .77</td>
<td>4.41 1.28</td>
<td>4.58 1.08</td>
</tr>
<tr>
<td>Record keeping</td>
<td>4.60 1.02</td>
<td>4.27 1.08</td>
<td>4.32 1.33</td>
<td>4.40 1.14</td>
</tr>
<tr>
<td>Supporting teachers</td>
<td>4.35 1.13</td>
<td>4.30 1.30</td>
<td>4.08 1.17</td>
<td>4.23 1.20</td>
</tr>
<tr>
<td>Evaluating teachers</td>
<td>4.30 1.16</td>
<td>4.24 1.02</td>
<td>4.05 1.29</td>
<td>4.20 1.15</td>
</tr>
<tr>
<td>Planning</td>
<td>4.38 1.14</td>
<td>4.21 .99</td>
<td>3.96 1.30</td>
<td>4.19 1.15</td>
</tr>
<tr>
<td>Organizing in-service training for teachers</td>
<td>4.39 1.16</td>
<td>3.90 1.26</td>
<td>3.25 1.42</td>
<td>3.83 1.35</td>
</tr>
<tr>
<td>Total</td>
<td>4.55 .95</td>
<td>4.35 .91</td>
<td>4.16 1.11</td>
<td>4.36 1.00</td>
</tr>
</tbody>
</table>

*Note.* Rating scale: 1 = very inadequate, 2 = inadequate, 3 = slightly inadequate, 4 = slightly adequate, 5 = adequate, 6 = very adequate.

The third objective of the study was to describe interpersonal qualities possessed by heads of agriculture department. Findings in Table 3 indicate that respondents agreed that heads of department in Botswana possessed the interpersonal qualities for effective supervision. Approachability received the highest mean rating ($M = 5.28$, $SD = .88$), and being a good listener ($M = 5.17$, $SD = .93$). The overall mean rating of the interpersonal qualities by the three group of respondents was $4.99$ ($SD = .79$).

The fourth objective of the study was to describe the relationship between perceived level of supervision effectiveness and independent variables. Correlations were used to describe the relationship between perceived supervision effectiveness and independent variables. Correlation descriptors developed by Davis (1971) were used to describe the strength of the associations. Pearson product moment ($r$) was used to measure the degree of associations for interval by interval variables, point biserial ($r_{pb}$) correlation coefficients were used for dichotomous by interval variables, and spearman rank order ($r_s$) was used for interval by ordinal variables. Table 4 shows the correlation coefficients between independent variables and supervision effectiveness.
Table 3

Perceived Interpersonal Qualities Possessed by Heads of Agriculture Department

<table>
<thead>
<tr>
<th>Perceived Interpersonal Qualities</th>
<th>Deputy School Heads (n = 27)</th>
<th>Heads of Agriculture Department (n = 27)</th>
<th>Agriculture Senior Teachers (n = 27)</th>
<th>Total (N = 81)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Approachable</td>
<td>5.04</td>
<td>.90</td>
<td>5.52</td>
<td>.58</td>
</tr>
<tr>
<td>A good Listener</td>
<td>5.15</td>
<td>.77</td>
<td>5.52</td>
<td>.64</td>
</tr>
<tr>
<td>Hardworking</td>
<td>5.22</td>
<td>.85</td>
<td>5.19</td>
<td>.88</td>
</tr>
<tr>
<td>Patient</td>
<td>5.00</td>
<td>1.00</td>
<td>5.15</td>
<td>.77</td>
</tr>
<tr>
<td>Achievement oriented</td>
<td>5.15</td>
<td>.91</td>
<td>5.26</td>
<td>.59</td>
</tr>
<tr>
<td>Confident</td>
<td>5.11</td>
<td>.97</td>
<td>5.15</td>
<td>.72</td>
</tr>
<tr>
<td>Sociable</td>
<td>4.89</td>
<td>1.25</td>
<td>4.93</td>
<td>.92</td>
</tr>
<tr>
<td>Sympathetic</td>
<td>5.00</td>
<td>.78</td>
<td>5.22</td>
<td>.80</td>
</tr>
<tr>
<td>Resourceful</td>
<td>4.96</td>
<td>.90</td>
<td>5.04</td>
<td>.76</td>
</tr>
<tr>
<td>Innovative</td>
<td>4.81</td>
<td>1.08</td>
<td>5.30</td>
<td>.78</td>
</tr>
<tr>
<td>Able to motivate staff</td>
<td>4.89</td>
<td>1.12</td>
<td>5.15</td>
<td>.72</td>
</tr>
<tr>
<td>Flexible</td>
<td>4.78</td>
<td>1.09</td>
<td>4.96</td>
<td>.85</td>
</tr>
<tr>
<td>Dependable</td>
<td>5.04</td>
<td>1.06</td>
<td>4.81</td>
<td>1.04</td>
</tr>
<tr>
<td>Good communicator</td>
<td>4.93</td>
<td>1.11</td>
<td>5.00</td>
<td>.90</td>
</tr>
<tr>
<td>Total</td>
<td>5.00</td>
<td>.79</td>
<td>5.15</td>
<td>.52</td>
</tr>
</tbody>
</table>

Note. Rating Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Slightly Disagree, 4 = Slightly Agree, 5 = Agree, 6 = Strongly Agree.

The findings indicate that, a very strong association \((r = .72)\) existed between supervision effectiveness and adequacy of supervision time. Adequate supervision time tended to increase positively with perceived level of supervision effectiveness. Also, the findings indicate a positive substantial association between interpersonal qualities possessed by heads of agriculture department and supervision effectiveness \((r = .63)\). Work experience prior to current position and amount of time spent performing a supervisory function, had a moderate association, \(r = .32\) and \(r = .30\), respectively, with supervision effectiveness. Other variables had low to negligible association with supervision effectiveness.

The fifth objective of the study was to identify explanatory variables for supervision effectiveness, the dependent variable. The analysis procedure used was multiple regression. Data from all respondents were included in the analysis. However, prior to conducting multiple regression the existence of multicollinearity among independent variables needed to be checked. Intercorrelations among independent variables were therefore, computed to determine the existence of multicollinearity.

Multicollinearity exists when there is a very strong association \((r = .80\) or above) between independent variables. High correlations are expected between a dependent variable and independent variables. Highly correlated independent variables are redundant, thus, measuring the same thing. Collinearity can lead to instability in the regression estimates, with changes in the data leading to large changes.
in the regression coefficients. Chatterjee, Hancock, and Simonoff (1995) explained that, the significance of individual variables is often understated in the presence of collinearity, due to inflation of the estimated standard errors and their associated estimated coefficients.

Table 4

Correlations Coefficients between Supervision Effectiveness and Independent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation Coefficients and Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequacy of supervision time (int.)</td>
<td>.72r Positive and Very strong</td>
</tr>
<tr>
<td>Interpersonal qualities (int.)</td>
<td>.63r Positive and Substantial</td>
</tr>
<tr>
<td>Sex (nom., 0 = female, 1 = male)</td>
<td>.14r pb Positive and Low</td>
</tr>
<tr>
<td>Age----years (int.)</td>
<td>.09r Positive and Low</td>
</tr>
<tr>
<td>Highest level of education (ord.)</td>
<td>-.06rs Negative and Negligible</td>
</tr>
<tr>
<td>Took supervision course at college/university (nom., 0 = no, 1 = yes)</td>
<td>.14r pb Positive and Low</td>
</tr>
<tr>
<td>Took management course at college/university (nom., 0 = no, 1 = yes)</td>
<td>.02r pb Positive and Negligible</td>
</tr>
<tr>
<td>Took administration course at college/university (nom., 0 = no, 1 = yes)</td>
<td>.14r pb Positive and Low</td>
</tr>
<tr>
<td>Salary level (ordinal)</td>
<td>-.07rs Negative and Negligible</td>
</tr>
<tr>
<td>Location of school (nom., 0 = rural, 1 = urban)</td>
<td>-.01r pb Negative and Negligible</td>
</tr>
<tr>
<td>Distance of residential place from school (int.)</td>
<td>.13r Positive and Low</td>
</tr>
<tr>
<td>Marital status (nom., 0 = single, 1 = married)</td>
<td>.16r pb Positive and Low</td>
</tr>
<tr>
<td>Work experience prior to current position (int.)</td>
<td>.32r Positive and Moderate</td>
</tr>
<tr>
<td>Number of years in teaching (int.)</td>
<td>-.24r Negative and Low</td>
</tr>
<tr>
<td>Mother in supervisory position (nom., 0 = no, 1 = yes)</td>
<td>-.05r pb Negative and Negligible</td>
</tr>
<tr>
<td>Father in supervisory position (nom., 0 = no, 1 = yes)</td>
<td>-.03r pb Negative and Negligible</td>
</tr>
<tr>
<td>Number of teachers supervised (int.)</td>
<td>.17r Positive and Low</td>
</tr>
<tr>
<td>Number of support of staff supervised (int.)</td>
<td>.16r Positive and Low</td>
</tr>
<tr>
<td>Number of students enrolled in agriculture (int.)</td>
<td>.04r Positive and Negligible</td>
</tr>
<tr>
<td>Number of teaching periods (int.)</td>
<td>-.02r Negative and Negligible</td>
</tr>
<tr>
<td>Length of teaching periods (int.)</td>
<td>.12r Positive and Low</td>
</tr>
<tr>
<td>Amount of time spent planning for teaching (int.)</td>
<td>-.06r Negative and Negligible</td>
</tr>
<tr>
<td>Amount of time spent teaching (int.)</td>
<td>-.06r Negative and Negligible</td>
</tr>
<tr>
<td>Amount time spent marking (int.)</td>
<td>-.02r Negative and Negligible</td>
</tr>
<tr>
<td>Amount time spent supervising (int.)</td>
<td>.30r Positive and Moderate</td>
</tr>
<tr>
<td>Amount of time spent in department meetings (int.)</td>
<td>.21r Positive and Low</td>
</tr>
<tr>
<td>Amount of time spent in meetings with school head (int.)</td>
<td>-.05r Negative and Negligible</td>
</tr>
<tr>
<td>Amount of time spent in other engagements (int.)</td>
<td>-.28r Negative and Low</td>
</tr>
<tr>
<td>Number of committees served in school (int.)</td>
<td>.14r Positive and Low</td>
</tr>
<tr>
<td>Number of committees served outside school (int.)</td>
<td>-.04r Negative and Negligible</td>
</tr>
</tbody>
</table>

Note. \( r \) = Pearson product-moment correlation coefficient; \( r_s \) = Spearman rank order coefficient; and \( r_{pb} \) = Point biserial correlation. Variable types included: int. = Interval; ord. = Ordinal; and nom. = Nominal.
Dlamini, Ngwenya, and Dlamini (2005) suggested that if multicollinearity exists, the related independent variables could be combined into one variable or the unimportant variable could be dropped. The combined variables should have the same units.

Findings of this study indicated existence of multicollinearity between age and number of years in teaching ($r = .91$), number of support staff supervised, and number of teachers supervised ($r = .91$). Other independent variables had low degree of multicollinearity. The related variables, which were highly correlated in this study, had the same units, as such; the variables were then combined prior to running regression analysis.

The stepwise regression analysis was used to determine independent variables that explained variance and predicted variance on supervision effectiveness by heads of agriculture department. Table 5 contains five explanatory variables for supervision effectiveness by heads of agriculture department. The variables explained 65% of the cumulative variance. Perceived adequacy of supervision time, the major independent variable, explained the greatest variance (52%). Interpersonal qualities of heads of agriculture department accounted for 6% of the variance in supervision effectiveness. Length of teaching experience prior to current position explained 3%; and amount of time spent in other engagements explained 2% of variance in supervision effectiveness.

Amount of time spent in other engagements revealed a negative regression coefficient of -.03. The negative regression coefficient implies that as amount of time spent in other engagement increased, supervision effectiveness reduced by a score of .03. The amount of time-spent teaching explained 2% of the variance in supervision effectiveness and also indicated a negative regression coefficient. The results revealed that as time spent in teaching increased, supervision effectiveness reduced by a score of .02 ($B = -.02$).

Since adequacy of supervision time is the main variable that influenced supervision effectiveness of heads of agriculture department, the hypothesis that perceived increase in supervision time explains more variance on perceived supervision effectiveness by heads of agriculture department, was, thus, accepted.

Table 5 contains five explanatory variables for supervision effectiveness by heads of agriculture department. The variables explained 65% of the cumulative variance. Perceived adequacy of supervision time, the major independent variable, explained the greatest variance (52%). Interpersonal qualities of heads of agriculture department accounted for 6% of the variance in supervision effectiveness. Length of teaching experience prior to current position explained 3%; and amount of time spent in other engagements explained 2% of variance in supervision effectiveness.
Table 5

<table>
<thead>
<tr>
<th>Variables Perceived to Explain and Predict Supervision Effectiveness by Heads of Department</th>
<th>$R$</th>
<th>$R^2$</th>
<th>$R^2_{change}$</th>
<th>$B$</th>
<th>$\beta$</th>
<th>$t$-value</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived adequacy of supervision time</td>
<td>.72</td>
<td>.52</td>
<td>.52</td>
<td>.45</td>
<td>.50</td>
<td>5.87</td>
<td>.01</td>
</tr>
<tr>
<td>Interpersonal qualities possessed by heads of department</td>
<td>.76</td>
<td>.58</td>
<td>.06</td>
<td>.31</td>
<td>.28</td>
<td>3.22</td>
<td>.00</td>
</tr>
<tr>
<td>Work experience as teacher prior to current position</td>
<td>.78</td>
<td>.61</td>
<td>.03</td>
<td>.03</td>
<td>1.5</td>
<td>2.08</td>
<td>.04</td>
</tr>
<tr>
<td>Amount of time spent in other engagements</td>
<td>.80</td>
<td>.64</td>
<td>.02</td>
<td>-.03</td>
<td>-.21</td>
<td>-2.87</td>
<td>.01</td>
</tr>
<tr>
<td>Amount of time spent teaching</td>
<td>.81</td>
<td>.65</td>
<td>.02</td>
<td>-.02</td>
<td>-.15</td>
<td>-2.12</td>
<td>.04</td>
</tr>
<tr>
<td>Constant</td>
<td>1.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Adjusted $R^2 = .64$, $SE = .44$.

Conclusions, Implications and Recommendations

Botswana senior secondary school heads of agriculture department were perceived to be effective and had adequate time in performing their supervisory roles. It appears heads of agriculture department devote their time in performing their supervisory roles, and thus, the perceived level of their effectiveness. Also, findings revealed that supervisors with the ability to communicate, motivated teachers, and were flexible, dependable, honest, approachable and patient and were likely to be effective in performing their supervisory roles. Schools need supervisors who can relate well with teachers and assist in solving teachers problems. The findings are consistent with a study by Dlamini (1988) who concluded that effective supervisors should be sociable, hard working, honest, patient, dependable, and should be able to communicate. The Teaching Service Management in the Ministry of Education of Botswana should consider the interpersonal qualities of teachers in selecting and promoting teachers to the position of head of department.

The findings on the associations between the independent variables and the dependent variable suggest that, for supervisors to effectively perform their supervisory roles, adequate time should be provided for planning, organizing in-service training for teachers, evaluating teachers’ performance, motivating teachers, and giving support to teachers. Nkambule (1998) also found that adequacy of supervision time explained and predicted supervision effectiveness of agriculture coordinators in Swaziland, and those agriculture coordinators needed adequate time to perform their supervisory roles. Other variables that explained and predicted supervision effectiveness were interpersonal qualities of heads of agriculture department, work experience prior to promotion to current position, amount of time spent in other engagements, and amount of time spent teaching.

The findings that work experience prior to current position increased with supervision effectiveness of heads of agriculture department suggest that teachers should be allowed to gain professional experience in their area of expertise before given the headship position as experience is a perquisite to such a responsibility. A study by Nkambule (1998) also found that teaching experience explained supervision effectiveness by agriculture coordinators in Swaziland. The findings of the current study also revealed that as more time was spent in other engagements, supervision effectiveness decreased. The finding was consistent with a study by Raundikar (1986), who concluded that many responsibilities diminish the effectiveness of supervisors. Malambe (2003) also found that inspectors in Botswana were hampered from performing their roles due to many...
responsibilities. Amount of time spent teaching indicated a negative regression coefficient, and the implication was that, teaching load of heads of department was high and thus, reducing supervision effectiveness.

Though the respondents agreed that the heads of department had adequate supervision time, a need is apparent for school heads to require heads of agriculture department to keep daily log of their activities for their supervisory roles, to monitor the use of time, ensuring that effective supervision does not erode. Since as more time spent in teaching is negatively related to supervision effectiveness, the Teaching Service Management in the Ministry of Education in Botswana should consider reducing the teaching time required of heads of agriculture department, so that heads of agriculture department can concentrate on supervision, and thus, improve their effectiveness.

The school heads should also collaborate with the Teaching Service Management in providing an in-service training programme on supervision. In-service training programme should target both newly recruited heads of agriculture department and those already in the service. The school libraries should provide materials, such as books, journals, and audio-tapes and video-tapes on supervision, for heads of agriculture department to enrich their supervisory skills.

Time spent in other engagements and time spent in committees outside the school was negatively correlated with supervision effectiveness. The heads of agriculture department should reduce additional responsibilities performed outside the school, so that more time can be available to plan, conduct meetings, evaluate teacher performance, organize workshop for teachers, and to keep teachers up-to-date with latest technology development in agriculture and to manage departmental business.

The study on supervision effectiveness was conducted in senior secondary schools; therefore, a similar study could be conducted in Botswana junior secondary schools. Such a study could provide the Ministry of Education with valuable information on the performance of heads of department in junior secondary schools. The findings could also serve as a basis for designing strategies that should improve supervision in junior secondary schools. This study focused on heads of department supervising agriculture teachers in senior secondary schools; a similar study could be conducted that encompass all heads of department in Botswana senior secondary schools. The study could focus on a more diverse group, hence; provide a complete inventory of effective supervision in Botswana senior secondary schools.

The conclusions of this study were based on perceptions of respondents. Thus, a case study based on observations need to be conducted to document the apportioning of time by heads of agriculture department. The value of such information would be useful in identifying strengths and weaknesses in time management.

References


Developing International Research Partnerships

Amy Harder, Assistant Professor
University of Florida
308C Rolfs Hall, P.O. Box 110540
Gainesville, FL 32611-0540
E-mail: amharder@ufl.edu

Gary J. Wingenbach, Associate Professor
Manda Rosser, Assistant Professor
Texas A&M University
E-mail: g-wingenbach@tamu.edu
E-mail: mrosser@tamu.edu

Abstract

Developing international partnerships is increasingly important for university researchers in the 21st century. A qualitative study was conducted to explore factors affecting faculty and student involvement in a collaborative project between Texas A&M University, U.S.A. and the Universidad Autónoma de Nuevo León, Mexico. Factors were found to cluster under the major themes of (a) research and programmatic opportunities, (b) communication, (c) international experience, and (d) student opportunities. Communication can be a significant barrier to participation in international collaborations, but faculty and students should be encouraged to pursue such experiences because of their many benefits.

Keywords: Collaborations, International, Partnerships, Research

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**Introduction**

Citizens of the 21st century are experiencing a global revolution. The advancement of many technologies now allows researchers in different countries to communicate in ways that are changing how business, education, and research are conducted. Forging international partnerships is particularly critical in areas where community issues transcend borders, such as in the border region between south Texas and northeastern Mexico. The United States Department of Agriculture’s International Science and Education (USDA-ISE) project sought to address this need by developing international partnerships between researchers at Texas A&M University and the Universidad Autónoma de Nuevo León. The research partnerships studied issues related to agritourism, plant science, aquatic ecology, and Latino attitudes towards natural resources. In addition to studying agricultural and natural resources issues, a goal of the project was to understand the dynamic nature of international partnerships.

**Review of Literature**

According to Etling and McGirr (2005), “partnerships between U.S. universities and institutions in other countries have often been problematic” (p. 15). The majority of problems associated with international partnerships were attributed to poor communication (Etling & McGirr). Issues with trust, power, risks, and rewards were all cited as common pitfalls.

Barriers to participation also exist for similar international activities, such as study abroad programs and international projects. Andreasen (2003) listed 20 potential barriers to international involvement. Those barriers were both extrinsic (i.e., time and financial concerns) and intrinsic (i.e., fear and lack of motivation). Wingenbach, Chmielewski, Smith, Piña, and Hamilton (2006) found perceptions of intrinsic barriers diminished for students who participated in an international experience, but concerns about language barriers and personal safety persisted after their participation. Hand, Ricketts, and Bruening (2007) identified similar barriers. Individuals are less likely to participate internationally when they perceive barriers exist (Irani, Place, & Friedel, 2006). Irani et al. recommended sharing success stories to ease concerns about potential barriers.

There are benefits to international participation. College students who participated in a field trip to Puerto Rico “indicated that the experience was important, valuable and meaningful to them in their professional and personal lives” (Bruening, Lopez, McCormick, & Dominguez, 2002, p. 73). Hand et al. (1997) found faculty members with international experience were strongly supportive of sending undergraduates abroad to broaden their perspectives and increase their employability. Boyd et al. (2001) noted participants in the International 4-H Youth Exchange “perceived that they were more sensitive to other cultures, more aware of global events, and more involved in community activities than prior to their participation” (Conclusions and Recommendations, ¶1). The impact of participants’ international experiences even extended to friends and families, who increased their awareness of global events because of their association with the participants (Boyd et al.).

Proper preparation can help minimize the impact of barriers to participation in an international experience while maximizing the benefits. Tritz and Martin (1997) developed a set of criteria considered to be necessary for a successful study abroad experience. In part, Tritz and Martin recommended (a) setting goals and establishing personal expectations, (b) developing an understanding of the host university’s expectations, (c) language training, and (d) learning customs. Practicing open communication was described as “essential” (p. 50). Common sense suggests these recommendations may
be extrapolated to similar types of international involvement, such as the USDA-ISE project. Additional research is needed to better understand the factors affecting the success of collaborative international partnerships.

**Purpose and Objectives**

The purpose of this study was to understand the factors affecting student and faculty involvement in the USDA-ISE project. Research objectives were to:

1. Describe participants’ perceptions of the benefits/advantages of participating in the USDA-ISE project,
2. Describe participants’ perceptions of the USDA-ISE project’s compatibility with their professional goals,
3. Identify barriers to participating in the USDA-ISE project,
4. Record participants’ methods for disseminating information about the USDA-ISE project.

**Methods**

This study was developed using a qualitative approach. Qualitative research assumes “meaning is embedded in people’s experiences and that meaning is mediated through the investigator’s own perceptions” (Merriam & Caffarella, 1999, p. 6).

Participants were chosen purposefully. Merriam (1998) stated, “purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight and, therefore, must select a sample from which the most can be learned” (p. 61). The target population included four faculty members and four graduate students at Texas A&M University (TAMU) and three faculty members and three graduate students at Universidad Autónoma de Nuevo León (UANL).

Initially, invitations for participation in the USDA-ISE project were extended to all department heads in the College of Agriculture and Life Sciences at TAMU, with the request to extend the invitations to all faculty members. Six faculty members expressed interest in the project; however, two members could not fulfill the project’s goals because of other obligations. Each of the four remaining faculty members subsequently invited a graduate student to participate in the project, based on his/her research interests. Similar invitations to participate were extended to all faculty members at the UANL. All the participants were a part of the USDA-ISE project.

The theoretical framework for the study was based upon Rogers’ (2003) diffusion of innovations theory. An innovation is defined as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003, p. 12). For the purpose of this study, the innovation was operationally defined as participation in a collaborative international research project (e.g., the USDA-ISE project). Rogers further stated innovations perceived to have high degrees of relative advantage and compatibility are most likely to be adopted. Relative advantage can be offset by barriers to participation (Schifter, 2000), so an understanding of both is important.

An online questionnaire was created by the researchers to gather data. The instrument was comprised of six open-ended questions (Table 1) and two demographic items. According to Patton (2002), “the purpose of gathering responses to open-ended questions is to enable the researcher to understand and capture the points of view of other people without predetermining those points of view through prior selection of questionnaire categories” (p. 21). Avoiding this pitfall was considered especially critical due to the cultural and linguistic differences between participants. The questionnaire was available in English and Spanish. Expertise from a native Spanish speaker aided in the translation processes for survey administration and interpretation.
Table 1

*TAMU and UANL International Research Partnership Online Survey Instrument, April 2006*

**Questions**

1. What are the benefits/advantages of participating in collaborative international research projects?
2. Describe how your participation in a collaborative international research project is compatible with your professional goals.
3. What are the difficulties/disadvantages of participating in collaborative international research projects?
4. Please list other faculty or graduate students in your department who are participating in international research, teaching, or outreach projects.
5. Describe how you have informed other faculty, staff, or students about your participation in this collaborative international research project.
6. Do you have other comments, suggestions, or questions that may be helpful for this project?

*Note:* Questions 4 and 6 were not analyzed for this study.

In April 2006, an invitation to participate in the study was e-mailed to all project participants for whom valid e-mail addresses could be obtained. The invitation included a hyperlink to an information and consent page. Participants entered their unique passwords to access the online questionnaire from the information and consent page. A reminder e-mail was sent to non-respondents one week later. The initial invitation and follow-up reminder were written in Spanish and English. Twelve responses were received.

Prior to data analysis, Spanish responses were translated into English for ease of comparison. Researcher translations were verified using Google™ Language Tools. The data were then coded to protect the respondents’ anonymity (TF = TAMU Faculty, TS = TAMU Student, UF = UANL Faculty, US = UANL Student) and thematically analyzed using content analysis. Content analysis is a “reduction and sense-making effort that takes a volume of qualitative material” and identifies “core consistencies and meanings” (Patton, 2002, p. 453). Data were searched for patterns of recurring words or subjects. Themes were derived from the patterns. In order to ensure the rigor of the study, an external evaluator reviewed the data. The review resulted in the confirmation of the thematic patterns.

The study is limited in its generalizability because of its qualitative nature. The quality of the open-ended responses is limited by the respondents’ writing ability. Participants’ status in higher education provided some assurance of sufficient writing ability. In addition, the ability to probe and delve deeper into the respondents’ experience was limited by the use of a survey instrument, which may curtail the depth of the findings.

**Results**

*Objective One: Perceived Benefits/Advantages of Participation*

Participants were asked to describe what they perceived to be the benefits/relative advantages of participating in collaborative international research projects. Two major themes were identified from the data: programmatic and research opportunities, and student opportunities. In addition, international experience was an underlying theme for this objective. Within these themes, there was some overlap in the identified benefits of project participation.

The programmatic and research opportunities theme consisted of several benefits. Access to new or alternative areas
of research, perspectives, and knowledge was most often mentioned by participants on both sides of the border (TF1, TF2, TF3, TF4, TS1, TS3, UF1, UF2, US1, US2). Other benefits included access to new materials and technology (TF1, UF1), improved programming for existing audiences (UF3, TS1), and increased possibilities for future international research (US1). The value of collaborating on international issues was described well by two researchers.

- Because social and environmental issues do not necessarily respect man-made boundaries, researchers need to collaborate with our international colleagues to better understand those issues without borders that impact our bi-national regions (TF4).
- Many research challenges transcend borders, and working with others to resolve these challenges provides a new perspective (TS1).

Graduate students were presented with multiple opportunities to benefit from their participation in the international research (TF2, UF3, US1, US2). These benefits were clustered by the researchers under the theme of student opportunities. School credit was an incentive for participation (US2). Students gained experience working on a real-life research project. One student commented “All projects have benefits, but this is important for me since it is my first project” (US2). Participation in the USDA-ISE project also provided an opportunity for faculty to meet and recruit prospective students (TF1, TF2).

Objective Two: Compatibility

Participants described how their participation in a collaborative international research project was compatible with their professional goals. Data were again clustered under the programmatic and research opportunities theme. Participants were able to broaden their approach to research (TF2). Their experiences aided in program development (TF3, UF1, UF2). In addition, promotion was linked to performing international research (UF3).

Personal interests and goals factored into the level of compatibility that collaborative international research projects had with the participants’ professional jobs. Students enjoyed the opportunity to gain experience for future careers (TS3, US1). One student said, “Participation in an international research project will provide me with not just cooperative, but collaborative problem-solving skills that are necessary for a successful professional career” (TS3). Another commented that his/her involvement in the USDA-ISE had influenced him/her to consider future involvement in international research, although it had not previously been a personal interest (US1). One TAMU faculty member was even considering a teaching sabbatical in Mexico (TF2).

The chance to take a team approach to common problems was highly valued. Working on an international team provided participants with alternative views of the same issues and exposed them to unique ways of addressing those issues (TF4, TS1, UF1, UF3). In addition, teamwork was thought to be very important for refining results and conclusions from investigative research (UF1). Collaborating with Mexican researchers was described as a “privilege” (TF4) and it was said that “working with others who share similar interests is very comforting, re-energizing, and an indispensable learning experience” (TS1).

Objective Three: Barriers to Participation

Participants cited several barriers associated with the USDA-ISE project, such as difficulty in understanding laws governing research activities in each country (UF2), different resources available at each university (TF4), and differences in research fields (UF3). The distance between universities, and cost of travel to research sites, were marked disadvantages (TF3, TS3, UF2, US1). However, participants most
often encountered difficulties with communication. Researchers documented their struggles to keep in touch with each other (TF1, TF2, TF4, TS1, UF1, UF3). Language was a significant concern for participants lacking bilingual abilities (TF2, TF3). Language was particularly troublesome for one pair of partners, who relied on a graduate student to do most of the translating since neither spoke the other’s native language.

Scheduling project-related activities was another communication issue (TF2, TF4). This was best described by one TAMU faculty member, who explained, “it is difficult to find collaborators with compatible schedules, resources, and workloads” (TF4). This sentiment was echoed by a second participant, who commented, “different activity schedules with those who have more teaching responsibilities and different vacation and field schedules make it harder to get together to talk” (TF2). With the challenge of matching schedules, even finding common time for a phone call was perceived as difficult.

The availability of computers at both universities did little to alleviate the communication issues. E-mail was said to be helpful, “but not entirely satisfactory” (TF4). In fact, one partnership was nearly dissolved due to issues with the TAMU university server. When the project started, the TAMU faculty member thought that the UANL faculty member kept ignoring project e-mails because no replies were received. Eventually, it was discovered the TAMU server was continually rejecting messages sent from UANL. The problem was resolved by opening e-mail accounts on a public e-mail server where partners were able to move forward with their research. Similarly, other UANL faculty noted the storage limits on their e-mail accounts made it difficult to save important messages for very long (UF1, UF2).

**Objective Four: Dissemination of Project Information**

As of this reporting, participants have completed three-fourths of their projects. During this time, participants informed others about their involvement in the USDA-ISE project through formal and informal processes. Formal processes included annual reviews and summary reports (TF1, TF3, UF1), development of new grant proposals (TF2), and research poster competitions (TS1). Future plans include conference papers and potential journal articles (TF2, UF1). Informally, participants disseminated information mostly during casual conversations with colleagues and peers (TF1, TF2, TF4, TS3, UF2, UF3, US1), but also in classes and seminar presentations (TF1, TF2, TS1, UF1), during faculty meetings (TF4), and by recruiting new students to assist with their projects (TF3, TF4).

**Educational Importance**

Although data from this project evaluation cannot be used to draw conclusions about participants’ future success in the USDA-ISE project, analyses revealed specific themes which impact this project’s long-term success. Expanded research and programmatic opportunities were important advantages associated with involvement, particularly for graduate students. Those students demonstrated willingness to overcome communication difficulties and they appreciated opportunities to expand their international perspectives. Too, it provided them valuable research experience and shaped their visions for the future. USDA-ISE project directors used the results of this project evaluation to encourage more graduate students (in Texas and Mexico) to become involved in an international research project. Directors of similar projects should consider the potential benefits of taking similar actions.

Many studies (Andreasen, 2003; Boyd et al., 2001; Bruening et al., 2002; Wingenbach et al., 2006) have shown
student participation in international experiences transcends the classroom. Students’ international participation illustrates our common equivalency; positive societal benefits can be gained from greater understanding of many cultures. Such experiences must be promoted in our teaching and research efforts. Students must be encouraged to continue demonstrating their willingness to understand other languages and cultures.

Faculty should recruit more graduate students for participation in international research, but they should strive to include undergraduates, as recommended by Hand et al. (2007). Perhaps the graduate students in the USDA-ISE project could serve as examples in their home universities to motivate peers into similar roles. The linkages between graduate and undergraduate groups can help lessen younger students’ fears (Irani et al., 2006; Wingenbach et al., 2006) about participating in international projects.

Rogers (2003) stated that innovations, such as participation in international collaborative project, are more readily adopted when individuals perceive the innovation to be consistent with their own values and beliefs. The results of this study indicate involvement in research such as the USDA-ISE project appeals to open-minded faculty and students who enjoy working in a team environment. This information is particularly helpful for project directors looking to recruit faculty and students for international projects. An investment of resources must be made when researchers are invited to join projects, so it is prudent to select individuals who are predisposed to becoming adopters of the innovation.

Communication issues were identified as the greatest barrier to participation. These issues must be resolved if the USDA-ISE project is to foster long-term international research collaborative partnerships. As Etling and McGirr (2005) found, many of the problems associated with international research projects between U.S. institutions and non-U.S. institutions were centered on communication difficulties. Similar findings were confirmed in this research. A conscious effort to practice open communication may alleviate problems (Tritz & Martin, 1997).

Potential communication problems should not dissuade researchers from undertaking international projects. Evidence suggests much can be gained, professionally and personally, from participation in international research projects. USDA-ISE project directors now have specific knowledge for improving a primary aspect found in all international collaborative projects: better communication among all participants.

Additional dissemination methods will be explored to promote the USDA-ISE project. As noted by Irani et al. (2006), sharing success stories may help to decrease perceived barriers to international involvement. Such stories, along with project findings, may be disseminated broadly by featuring them on the USDA-ISE project Web site. Project directors are encouraging all participants to submit their research studies to international research conferences and journals. An especially important element in reporting and presenting these studies is that such dissemination should be accomplished jointly, just as the projects have been conducted to date. If U.S. and Mexican faculty members and graduate students jointly report and present their results, the bonds of international research project collaboration will be strengthened.

References


A Meeting of the Minds: Farmer, Extensionist, and Researcher

Michael G. Angstreich
Senior Advisor for Development Cooperation
Bioforsk - The Norwegian Institute for Agricultural and Environmental Research
Høgskoleveien 7
1432 Ås, Norway
E-mail: michael.angstreich@bioforsk.no

Moses M. Zinnah
Agricultural Extension Specialist
Winrock International
c/o Sasakawa Global 2000
P.M.B. Airport, Accra, Ghana
E-mail: mmzinnah57@yahoo.com

Abstract
This paper constitutes a formative look at how local knowledge and western science, both social and natural, might be integrated for the benefit of smallholder agriculture in developing countries. The question addressed is: How can research and extension be more responsive to the needs of local farmers and what are some possible elements of a responsive approach? A comparison of local knowledge and western science is given. Constructivist, experiential learning approaches such as Participatory Technology Development (PTD), Participatory Rural Appraisal (PRA), Farmer Field School (FFS) and Promoting Farmer Innovation (PFI) that use the farm as a learning system and farmer-driven on-farm trials are among the qualitative and quantitative methodologies that can contribute to the knowledge and needs of researchers, extensionists and farmers. Using case studies from East and West Africa and a review of the literature, this paper addresses issues related to strengthening effective linkages between farmers, extension professionals and researchers.

Keywords: Experiential Learning, Farmer-Extension-Research Linkage, Local Knowledge, Participatory Technology Development
Background

Along with constructivist, experiential learning of agriculture and natural resource management in higher education institutions, innovative pedagogy is needed in the meeting between researcher, extensionist and farmer (Doolittle & Camp, 1999; Van den Bor, Bryden, & Fuller, 1995). Farmers’ knowledge and experience, the farm as classroom and laboratory form elements of a constructivist approach to learning.

In a study of Sahelian countries by CILSS and Devres, Inc. (1984) poor linkages between researchers, extension services and farmers were cited as major constraints to enhancing agricultural development in Africa. It recommended agricultural professionals to improve their understanding of and communication with farmers. Twelve years later, a study of Sub-Saharan Africa by Wallace, Mantzou, and Taylor (1996) found that higher education and non-formal training both lacked dynamism and were often isolated from research and extension as well as from the “rich learning resources” inherent in local communities. Despite massive financial investments, agricultural education and training was unresponsive to changing realities in rural economies. The authors argued, among other things, for closer integration of agricultural research and extension. They recognized exceptions but noted a general ignorance of the needs of vulnerable target groups, adult learners, local production systems and indigenous knowledge. This view is shared by Freire (1997), who relates how as a consultant for the Chilean Ministries of Education and Agriculture, he came away from field visits impressed with how much more the peasants knew than the experts.

Integrating Local Knowledge and Western Science

To date, the roles local men and women play in preserving, developing, promoting and practicing local knowledge are not sufficiently incorporated into development policies and practices. A fundamental feature shaping world development has been the faith that science can find technological solutions for most problems. Science has brought spectacular successes to humankind, not least in agricultural production and productivity. However, there is now a general recognition that many problems have arisen as well. Pests and diseases are becoming more resistant to chemical treatments, food production increases through technology packages have not necessarily benefited the very poor, and other technological advances have led to pollution and environmental degradation. In short, western science by itself does not sufficiently accommodate all the realities of those affected (Brokensha, Warren, & Werner, 1980; Molteberg & Bergstrøm, 1998; Warren, Slikkerveer, & Titilola, 1989).

Indigenous and local knowledge is location-specific, based on close personal observation and experience over generations. As Sillitoe (1998) argued, local knowledge is generally conditioned by one’s socio-cultural contexts. It is also embedded in value, production and consumption systems, as well as ways of relating to the natural environment. Local knowledge is generally transmitted orally from one generation to the next and the concept of “Mother Earth” is central. Western scientific knowledge on the other hand is generally perceived as analytical, impersonal, universal, logically deducted from self-evident principles and transmitted in written form (Häusler, 1996). Table 1 displays dichotomies between local knowledge and western science.
### Table 1

**Comparing Local Knowledge and Western Science**

<table>
<thead>
<tr>
<th>Local Knowledge</th>
<th>Western Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Oral tradition</td>
<td>• Written tradition</td>
</tr>
<tr>
<td>• Learned through observation and hands-on experience</td>
<td>• Taught and learned abstracted from the applied context</td>
</tr>
<tr>
<td>• Holistic approach</td>
<td>• Reductionist approach</td>
</tr>
<tr>
<td>• Intuitive mode of thinking</td>
<td>• Analytic and abstract reasoning</td>
</tr>
<tr>
<td>• Mainly qualitative</td>
<td>• Mainly quantitative</td>
</tr>
<tr>
<td>• Data generated by resource users (inclusive)</td>
<td>• Data generated by specialists (exclusive)</td>
</tr>
<tr>
<td>• Diachronic data (long time-series on one location)</td>
<td>• Synchronic data (short time-series over a large area)</td>
</tr>
<tr>
<td>• Environment part of social and spiritual relations</td>
<td>• Hierarchical and compartmentalized organization</td>
</tr>
<tr>
<td>• Based on cumulative, collective experience</td>
<td>• Based on general laws and theories</td>
</tr>
</tbody>
</table>


There is growing recognition that the value of local skills and knowledge built up through the centuries and honed by harsh natural environments could, in combination with modern science, be a key element in devising workable decisions on research and extension interventions.

**How Can Research and Extension be More Responsive to the Needs of Local Farmers and What are Some Possible Elements of a Responsive Approach?**

A judicious integration of local knowledge and western science can lead to improvements in agriculture and natural resource management. Onduru, Gachini, and Nandwa (1998) provided an interesting example from Kenya. Small farmers from both high and low potential areas and researchers from the Kenya Institute for Organic Farming (KIOF) and the Kenya Agricultural Research Institute (KARI) worked together to diagnose local soils. They used Participatory Technology Development (PTD) approach which involved the major stakeholder stakeholders, including farmers, researchers and other end-users in the research and development process. Using quantitative and qualitative methods in an approach that included both social and natural sciences, a participatory soil diagnosis was carried out with selected farmers in Nyeri and Machakos.

Four main steps were employed in the participatory soil analysis carried out by KARI, KIOF, and local farmers. First, to encourage good two-way communication with farmers, the researchers were trained in the use of Participatory Rural Appraisal (PRA) techniques, including visual-aids for making objects, abstractions, and system linkages comprehensible. Second, an inventory of farmers’ knowledge through transect walks with selected farmers led to maps that delineated and colored all soil types according to the farmers’ own knowledge and typology. These soil types were qualitatively analyzed using pair-wise and matrix ranking based on the farmers’ views on relative importance, use intensity,
crops cultivated on them, as well as positive and negative attributes. Third, the researchers conducted quantitative soil analysis for each of the soil types identified by the farmers to assess the major nutrients, organic matter content, and soil pH. Colored bar charts were made depicting soil nutrient conditions for each farm and symbols were used to represent symptoms (e.g. stunting, purpling, chlorosis, etc.) of deficiency or sufficiency of nutrient elements. Finally, each farmer’s own colored soil map from step two was compared to the researchers’ analysis visualized in the colored bar charts from the step three. Data for Nitrogen, Phosphorus, Potassium, Organic Matter, and pH were presented for all soils identified by the farmers. Farmers and researchers jointly discussed the results and implications of their respective soil analyses. A number of recommendations on how best to resolve nutrient deficiencies were suggested and compiled by both farmers and researchers.

This participatory soil diagnosis clearly showed that there was considerable correlation between the results of the two. It was concluded that although farmers use qualitative means to diagnose their soil types, they generally know the types and nutrient status of their soils to ensure sustainable agricultural practices. For their part, the scientists were able to advice on new sustainable agriculture practices that would enhance farmers’ soils and production (Onduru et al., 1998). This process complemented and increased the knowledge of participating farmers and researchers.

These results are consistent with results of a seminal study by Richards (1986) that showed that African farmers have always been and continue to be great agricultural innovators and experimenters and that much can therefore be learned from them.

**Farmer-Extension-Research Links**

One of the challenging problems of agricultural development efforts in developing countries is ineffective working relationships between farmers, extension staff and researchers (Kaimowitz, 1990; Merrill-Sands, Kaimowitz, Sayce, & Carter, 1989; Zinnah, 1994). Linkage problems not only reduce efficiency, but also impair performance and the impact of agricultural research and extension services. There is the need to strengthen the linkages between these supposedly interrelated subsystems.

Studies on returns to investment in agricultural research and agricultural extension have been conducted in both industrialized and less industrialized countries. Most of these studies report high rates of return, probably more favorable returns than on other investments in agriculture, such as irrigation (Pinstup-Andersen, 1982; Ruttan, 1982 in Van den Ban & Hawkins, 1988). Studies of the economic returns to investment in agricultural extension across several continents—Africa, Asia, Latin America, USA and Japan—have consistently shown positive results on agricultural production and productivity, especially where farmers have access to education and new technology, and strong linkages between national research and extension programs (Bindlish & Evenson, 1997; Evenson, 1997). However, a study by Evenson (1986) found that investments in agricultural research did not increase the returns on extension investments in less industrialized countries because of an often poor linkage between research and extension in those countries.

There is a tendency for government extension services to provide traditional types of rehearsed, production-oriented, technical training approaches that are out of reach for marginal farmers. The approach is often top-down, with little effort to draw out local indigenous technical knowledge or to adopt “farmer-first” approaches. Commonly, the skills and information that would be of help to subsistence producers, rural women and part-time farmers get little or no attention. Many extension services still do not include emerging improved technologies...
such as integrated pest management (IPM), agro-forestry, low external input farming (LEIF), and integrated aquaculture that contribute to sustainable livelihoods (Chambers, Pacey, & Thrupp, 1989; Doppler & Maurer, 1992; FAO, 1992; Wallace, 1986).

Recent extension approaches such as Farmer Field Schools (FFS) and Promoting Farmer Innovation (PFI) that emphasize experiential education, community development, and organizational issues have galvanized a great deal of enthusiasm among farmers and development practitioners in a number of Asian and African countries (Anandajayasekeram, Davis, & Workneh, 2007; Critchley & Nyagah, 2000; David, 2007). However, there are disagreements about the advantages of these interventions such as the lack of a monitoring and evaluation system at the farmers’ level that both farmers and researchers find user-friendly and functional, how to bring research agencies more into the researcher-extension farmer triangle, high cost in terms of time and effort, and how to involve more women and youths into the process (Feder, Murgai, & Quizon, 2004).

**Effective Communication**

Research findings are useless if they are not communicated effectively, and research itself cannot be effective without two-way communication between farmers and researchers. Extension is meant to provide a key communication link here, conveying information about the farmers’ situation, the problems they encounter and their own experience with research (Van den Ban & Hawkins, 1988). Extension methods are those ways of communicating that are used for influencing farmers and researchers. The success of extension work, whether it is encouraging farmers to try a new technology or passing vital information from farmers to researchers and decision-makers, depends on good two-way communication (Simbowo & Campbell, 1992). Swanson (1997) also stresses the need for research and extension leaders and practitioners to develop the skills of listening in order to understand what farmers are communicating to them via informal and formal means.

Farmers are experts in their own eyes. If information presented does not relate to their experience-based knowledge and skills, it is most likely that the information will be judged as irrelevant. Therefore, communication with farmers should entail a process of bringing to light tacit knowledge, while at the same time generating a learning process in which new knowledge is created or generated through increased consciousness (Vedeld, Moulton, & Krogh, 1998).

**New Competencies are Required**

Just as the ability to convey technical skills will always be important, so will the extension officer’s social competence. Conceptual frameworks and theories on social construction and the enhancement of social organizations and institutions and participatory types of field work are of key importance in meeting the research and extension challenges of rural development. The capability to create common meeting grounds with rural men and women needs attention and improvement. Experience from research in Norway indicates that this kind of competence development must be based on making participants utilize their practical experience and knowledge in developing a better theoretical understanding of their daily work life. This takes time, and efforts should be made by researchers and extensionists to interact closely with rural dwellers in developing and implementing such learning processes (Vedeld et al., 1998).

Many authors concur with the need for new competencies for a new generation of agricultural professionals by emphasizing the need for conventional approaches to agricultural education, research and extension that reduce and divide knowledge into neat departments and disciplines and
then treat such knowledge as a dispersible commodity will need to be modified (Antholt, 1994; Knipscheer, Zinnah, & Mutimba, 2002; Sriskandarajah, Bawden, & Packham, 1989; Van den Ban, 1998; Zinnah, Steele, Carson, & Anor-Frempong, 2001). They argued that tertiary agricultural education institutions have critical roles to play in ensuring that the new generation of agricultural professionals, including researchers and extensionists, acquire these emerging competencies and skills which include, among other things, the ability to: be critical and systems thinkers; work in participatory modes; diagnose clients’ needs effectively; listen to and learn from clients; communicate clearly; facilitate experiential learning; mobilize technical and political and other support; identify opportunities for training; work in a rapidly changing and complex environment with little supervision; and present practical options to clients based on sound agricultural practices.

**The Farm as a Learning System**

Reductionist education, research and extension approaches tend to separate knowledge into discrete components and distribute it as a commodity. But as some authors argue, research and extension should focus on the farm as a learning system because this enables them “to create new learning systems – new ways for them to learn how to create new sets of persistent relationships between themselves and the bio-physical and socio-cultural environments which surround them” (Sriskandarajah et al., 1989, p. 5). Each situation is unique and experiential learning is a necessary ingredient for designing new learning systems that will encourage co-learning relationships between the main players of the agricultural knowledge system-extensionist, researchers and farmers. Nevertheless, there are methodological challenges in developing learning systems. To overcome these challenges, Sriskandarajah et al. also recommended a shift from viewing farms as production systems that are constant victims of adverse environmental forces and constant threats to the environment, to viewing farms as learning systems in constant co-evolution with their environments.

In a similar vein, Christoplos and Nitsch (1993) opined that it is less important that the complexity of farming becomes a subject for research, than that it becomes a subject for joint reflection and action among farmers, researchers and extensionists and that the dialogue between them is strengthened. They argued that when this shift is realized, education, research and extension become complements of one process of learning, and knowledge ceases to become a commodity for transfer from researchers to farmers, and this ultimately results in mutual collaboration between co-learners. The Experiential Learning Circle in Figure 1, which is a modified version of Kolb’s (1984) seminal work on experiential learning as modified and adapted by Christoplos and Nitsch, Sriskandarajah et al. (1989), Veil (1996) and others, best illustrates the need to make experiential learning the main ingredient for enhancing co-learning relationships and meaningful linkages between researchers, extensionists and farmers.

![Figure 1. The experiential learning circle.](image-url)

<table>
<thead>
<tr>
<th>Observation and Reflection</th>
<th>Concrete Experience, Values, Goals</th>
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<tr>
<td>Abstract Conceptualization</td>
<td>Dialogues</td>
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<tr>
<td>Theories, Research Findings</td>
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<td>Active Experimentation</td>
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*Figure 1. The experiential learning circle.*
Conventional, reductionism result-oriented training programs are usually measured by how the recipients or trainees are affected or influenced. Understanding-oriented pedagogy, on the other hand, is based more on mutual and open communication. A balance needs to be struck. Too much emphasis on result-oriented training risks closure. Important ideas and information will not be brought up and shared. Equally important, the agricultural professional’s competence may not be satisfactorily challenged and enhanced as it would when confronted by the knowledge, experience and criticism of others. Operating with and reflecting over the essence of “tension zones” can, in the experience of Vedeld et al. (1998), promote an understanding-oriented competence development. Table 2 illustrates dichotomies in themes and participants, the reflection on which may also contribute to a productive meeting of the minds involved in participatory agriculture and natural resource development actions.

Table 2

<table>
<thead>
<tr>
<th>Tension Zones between Different Dichotomies</th>
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<tbody>
<tr>
<td>Theory</td>
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<tr>
<td>Natural science</td>
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<tr>
<td>Modern knowledge and technology</td>
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<tr>
<td>Exploitive use</td>
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<tr>
<td>National policy</td>
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<tr>
<td>Extensionist</td>
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<tr>
<td>Researcher</td>
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<td>Higher education</td>
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<td>Researcher</td>
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**A Simple, Scientific Farm Classroom**

Earlier in this paper, a participatory soil diagnosis in Kenya by Onduru et al. (1998) was presented. This section, which relies heavily on Mutsaers, Weber, Walker and Fisher (1997) and their experience from West Africa, provides some guidelines for running farmer-driven trials, in which the farmer’s own practical expertise is combined with simple Western science, contributing to the enlightenment of all participants, including farmers, researchers and extensionists. The objective would be to test the performance of external technology in comparison with the farmers’ own practices, on the farm and under farmer management. Researchers would help farmers with the external technology while not interfering with otherwise sound practices of the farmers. As for the technology, it should start with the elementary, that is it should not consist of more than one innovation, for example, a new crop variety or fertilizer applications to one crop. The target population for the technology needs to be defined and a representative sample of trial farmers selected, including women. A fixed and random sampling approach is used: fixed in the sense of defined categories, such as
women and/or villages, with random selection within such categories. Farmers should actively participate in formulation of hypotheses for and the design of trials. Whatever the factor combination, single or more, the important thing is that farmers should be able to comprehend exactly what is being tested and be able to evaluate the results. Farmers’ own assessment of the trials is probably the most important evaluative element in such trials. Monitoring farmers’ adoption of new technology will indicate their conviction of its worth. Quality results and solid conclusions from the trials depend on the collection of good information. Mutsaers et al. (1997) recommend the following data set as the minimum necessary for farmer-run and farmer-managed on-farm trials: (1) Plot Level (stand counts at establishment, midseason and harvest, density of secondary crops, pest and disease scores (ordinal), weed scores (ordinal), repeated a few times, or number and times of weeding, shade scores (if applicable), crop yields, inputs which differ between treatments, including labor, and farmer assessment of treatments; (2) Field Level (depth of soil profile, soil texture (sandy, medium, heavy) at two depths: 0-15 and 15-30 cm, soil pH at 0-15 and 15-30 cm, slope and position on slope, crop management information which is not part of the treatments (date of planting, field history, land preparation, varieties, plant arrangement), and age and sex of farmer and origin (indigene or immigrant); and (3) Village Level (rainfall (daily, mm), prices of inputs, wage rate during the season, output prices at end of season).

**Conclusion: Challenges Abound**

Innovative experiential approaches that successfully integrate local knowledge and western science, such as Participatory Technology Development, Participatory Rural Appraisal, Farmer Field School, Promoting Farmer Innovation, farmer-managed experimentation and the farm as a learning system have been very useful in various developing country settings. They contribute to the knowledge and needs of researchers, extensionists and, not least, farmers. As such, they should continue to be promoted and evolved. However, even the best methodologies will have little impact if the national policy environment is non-conducive to agricultural and rural development. Education, extension and research are but components of a larger structure. Issues such as land tenure, access to credit, inputs and markets, gender anomalies and structurally adjusted budgeting all affect the performance of agricultural development efforts.

In many African countries, the national extension services are so run down that they often neglect the poorest. The need for requisite funds and manpower to make the services effective is urgent. Innovative approaches cannot flourish without strong, supportive institutions to serve them (El Feki, 2000; Øygard, 1999).

It is also vital to recognize that agricultural colleges and universities have a critical role to play in the process, especially by incorporating new participatory extension approaches into their academic curricula. Educating agricultural development professionals to enable involvement of farmers in joint validation and experimentation is innovative in itself. However, as Knipscheer et al. (2002) and Zinnah and Mutimba (1998) point out based on their work with selected universities and colleges in sub-Saharan Africa on an innovative training initiative for mid-career agricultural extension professionals under the auspices of the Sasakawa Africa Fund for Extension Education (SAFE) program, many challenges persist. Generally, there is a low level of formal training of agricultural extension staff in comparison to their research counterparts. Financial support from domestic sources for training programs aimed at strengthening effective farmer-extension-researcher interactions is scarce. Such responsive training initiatives are largely supported by external funds.
Inadequate facilities and motivation in universities stunt the promotion of innovative farmer-driven and learner-centered training and outreach programs. Current trends of diminishing budgets for tertiary institutions in Africa require that alternative, innovative, non-governmental sources of funding need to be developed if universities and colleges are to be more engaged in offering responsive, experiential and participatory extension training programs.

With better linkages between research, extension and the farm, Evenson (1997) estimates that it would be profitable for developing countries to invest about one per cent of the gross value of agricultural production in agricultural extension services. Even so, the lack of support resources may dictate that just as resource-poor farmers must adapt to their local environments, so must resource-poor extension services adapt to their local constraints.

References


Community-based Ecotourism Design Studio in the Yucatan Peninsula: Enhancing Study Abroad with a Service-learning Component

Charles Klein, ASLA
Assistant Professor
Department of Landscape Architecture
Texas Tech University
PO Box 42121
Lubbock, TX 79409-2121
E-mail: Charles.klein@ttu.edu

David Lawver, Ed.D
Texas Tech University
E-mail: David.lawver@ttu.edu

Abstract
The benefits of study abroad programs in U.S. higher education are well documented. Lewis and Niesenbaum (2005) concluded that incorporating a service-learning component can greatly enhance a short-term study abroad program for the participant.

The purpose of the paper is to document the preliminary results from an on-going study to determine the benefits of incorporating a service-learning component into a study abroad program. A qualitative, rather than quantitative approach was used in the evaluation process. The research involves a course in community-based ecotourism for landscape architecture students from Texas Tech University. It includes three weeks of travel and service-learning projects for rural Mayan villages. Students kept journals as their service-learning reflection activity that were analyzed utilizing the qualitative techniques described by Boyd, et al (2006) to determine themes of students’ interest or concern. The writing was further analyzed within The Taxonomy of the Affective Domain (Krathwohl, 1964) to document the level at which the students were reflecting on their experience.

The results indicate an increased level of affective learning by most students, which correlate closely with those of Lewis and Niesenbaum (2005) who found that linking community-based experiences with a study abroad curriculum enhances learning. Lewis and Niesenbaum also reference studies that indicate reasons why many students do not study abroad, including financial constraints and academic requirements. These concerns are echoed by the authors’ interviews and discussions with students and colleagues. Therefore, students can receive similar benefits from a short-term setting who are unable to participate in long-term programs.

Keywords: Community-Based Ecotourism, Service Learning, Study Abroad, Mexico, Landscape Architecture
Introduction

The benefits of a study abroad program in higher education are well documented. These include experiencing personal growth, developing valuable career skills and “Becoming a ‘Global Citizen’ in Today’s interconnected world” (Northwestern University’s Study Abroad Office). A long term study by Dwyer and Peters (2004) of study abroad participants from the last 50 years provides indications of extremely positive, personal, educational and career growth among the participants. The study, sponsored by the Institute for the International Education of Students, surveyed participants who studied abroad between 1950 and 1999. Programs included full-year, fall semester, spring semester and summer programs. Results indicate that 97% of the participants experienced personal growth to the extent that one individual stated she learned more about herself in one semester abroad than she did in over three years of college. Over 90% of the participants reported greater cultural awareness, not only of other cultures, but of their own. Dwyer and Peters (2004) also reported that the often profound experiences were also reported to be long-term and non-fleeting. Academic and career matters were also influenced by the study abroad experience. Educational decisions were influenced in approximately 70% of the cases, while career choices were influenced in 75% of the participants.

Dwyer and Peters (2004) also found that longer study abroad experiences generate greater benefits, yet the trend is for shorter programs, as indicated by the fact that in the 1990s only 20 percent participated in a full year abroad as opposed to 70 percent in the 1950s and 1960s. Furthermore, three times as many participants studied for less than ten weeks in the 1990s than in the 1950s and 1960s. Given the trend toward shorter term study abroad programs, one can conclude that strategies that enhance such programs need to be developed in order to approach the effectiveness of long-term programs.

The benefits of a study abroad program can be greatly enhanced by including a service-learning component. Lewis and Niesenbaum (2005) concluded that by incorporating this pedagogy, a short-term study abroad program can approximate long-term study abroad outcomes. They also found that short-term programs that included a community service-learning aspect were more appealing and more accessible to students who would not otherwise choose, or be able to participate in an international program due to road blocks such as financial constraints, curriculum conflicts, or post 9/11 fears about foreign travel.

According to Kendall (1990) a community service-learning program can be especially beneficial in developing important civic and social responsibilities for U.S. students. According to Sharkey (1994) the profession of landscape architecture should commit itself to several societal imperatives, including “improving the condition of the community and society,” as well as “protecting cultural and historic values of a region or a nation.” The American Society of Landscape Architects (ASLA) includes in its definition of the profession a reference to the necessity for landscape architects to apply cultural knowledge as an aspect of the design process (ASLA Constitution, 1975). Additionally, Hamed (1991) notes that foreign countries, many of them underdeveloped countries, are seeking assistance from professional design and planning firms for their urban and industrial development projects. He suggests that U.S. landscape architecture programs are not preparing students to adapt design decisions to foreign cultures and should take a stronger role in promoting the education of students for international practice.

We propose that a study abroad program for landscape architecture students can provide the opportunity to emphasize the cultural aspects of design in a setting...
very different from the traditional classroom or studio setting. Additionally, service-learning’s emphasis on civic responsibility should help provide the opportunity to develop students’ knowledge and sense of civic responsibility. And finally, combining service-learning with study abroad should be able to greatly enhance the educational value of both forms of learning.

**Purpose and Objectives**

The purpose of this study was to determine the benefits of incorporating a service-learning component into a study abroad program for U.S. landscape architecture students. Additionally, the study investigated the effectiveness of service-learning reflection activities in the study abroad setting. A qualitative, rather than quantitative approach, to the evaluation of an on-going program was used to determine the benefits to U.S. landscape architecture students. Opportunities for program improvements were investigated and evaluated in light of the information gathered.

**Theoretical Framework**

Service-learning is a form of experiential learning (McAleavey, 2006). Learning activities that make a direct connection with the subject of the curriculum are considered to be experiential learning. Dewey (1938) made the assertion that one learns well or better when doing. Kolb (1984, p. 41) defined experiential learning as “the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience.” Service-learning takes the concept of experiential learning further. Whereas the focus of experiential learning is the learner, the focus of service-learning is twofold. According to Kendall (1990, p. 40), “Service-learning programs emphasize the accomplishment of tasks which meet human needs, in combination with conscious educational growth.”

An effective service-learning program involves a diverse group of committed participants engaged in a community service activity that has clear goals for both service and learning outcomes. It includes opportunities for critical reflection as an important learning activity and a full range of preparation, project management and assessment techniques.

In keeping with Kendall’s principles, the service-learning aspect for this project utilized the community-based ecotourism concept, which is a subset of traditional ecotourism. It emphasizes the development of cultural tourism activities that benefit the local indigenous citizenry to a far greater extent than any other form of tourism. It provides the unique opportunity for U.S. landscape architecture students to become involved in both community design and cultural design in a service-learning setting.

**Methods**

In order to better evaluate a phenomenon in its natural setting, qualitative and case study research have become common in the field of education. Intentions of case study research are not to explain phenomenon, but to, the situation and generate meaning from its context (Gall, Borg, Gall, 1996).

This study, conducted by an interdisciplinary group of professors of landscape architecture and agricultural education and communication, involves the evaluation of an on-going study abroad program conducted by the Department of Landscape Architecture at Texas Tech University. To date, three summer classes have traveled to Mexico’s Yucatan Peninsula where students became immersed in the culture, history, and environmental uniqueness of the area. They visited and evaluated a variety of ecotourism venues, including community-based programs in two Mayan villages. They conducted several design studios in those villages and produced schematic design documents that the citizens have used for a variety of...
purposes, including grant applications for infrastructure funds.

The programs began prior to departure with meetings and discussions on the logistics of traveling in a foreign country: required documentation, what to pack, what to expect, budget, and other important details. The National Geographic video “Dawn of the Maya” served as an introduction to Mayan history and its mysteries. Finally, readings provided additional historical information and the initial academic assignment for basic background knowledge of ecotourism and community-based ecotourism.

The in-country schedule was arranged along the lines of the traditional landscape architectural design process. It started with a contextual analysis and case studies in the form of visits to historical, cultural, and environmental venues. The sites were chosen, in advance, by the professor leading the program based on previous visits to the area. This helped the students to more completely understand the uniqueness of the Yucatan Peninsula. Some of the sites visited included ecotourism venues of various descriptions from large corporate operations, to individual and Non-Government Organization (NGO) facilities and community-based programs. More extensive background research was included in the form of the additional readings which covered sustainability issues and case studies of ecotourism and community-based ecotourism projects. The readings were reinforced through discussions with the professors and special guest lecturers. These included prominent conservationists, anthropologists, and archeologists. For example, Dr. Alan Myers professor of archeology, Eckerd College, provided a presentation on the history and findings at Hacienda Tabi that includes a discourse on how the built environment was developed in order to reinforce superiority over the workers in a debt/peonage social structure.

Following several weeks of travel, meetings and discussions, students traveled to indigenous Mayan villages to conduct their design studios. These villages are interested in or have the opportunity to develop community-based ecotourism programs. To date the program has worked with three villages: Yaxunah, Yaxhachen, and Xcobenhaltun. All are in the Mexican state of Yucatan.

In all of the design studios, students met with the local citizens, committee members and civic leaders. They interviewed them and worked to understand their needs, aspirations and requirements before proceeding with the design process. This is a particularly important part of the program from the standpoint of civic engagement and communication. Therefore it was important for students to understand and participate in the civic design process. In some cases the community design aspects were more prominent than the tourism aspects of the design problem. Additionally, students worked hard to communicate with individuals who speak a foreign language. In Yucatecan villages, the first language is Mayan; the second language is Spanish, and if they speak any English, it would include only a few words or phrases. Therefore, students relied on translators, in which case they needed to use only basic English rather than the jargon of landscape architects often found in traditional studio settings. Additionally, since landscape architecture’s focus is visual, students were encouraged to use graphics to communicate information during the trip to the Yucatan. They all carried sketchbooks that were readily available for drawing a quick idea or potential design solution.

The sketchbook provided for another very important function. Students were required to keep a journal as part of the service-learning reflection activities. They were told in advance that it was a course requirement which would be collected, copied and read for further study and analysis. The students were also encouraged to express their genuine feelings, not what they think the professor wants to read.
Specific instructions in the form of prompts and questions were provided for daily reflective writing activities. Three additional prompts, which are the focus of this study, were provided for a pre-reflection essay, an intermediate essay, and a post-reflection essay. These writing activities were first used during the 2005 summer program when the service-learning coordinator for Texas Tech University participated in the program and helped develop and investigate the effectiveness of various forms of reflection activities. The students seemed most receptive to the idea of journaling out of all the service-learning reflective activities investigated.

Denzin and Lincoln (1995) explained that in order to be a bricoleur researcher various methods must be used that develop an intertwined set of methodological practices allowing for a better perception of the subject matter at hand. Due to the need of various methods in interpretive research, triangulation was established in order to analyze the data more effectively. Each student individually wrote in a journal (Denzin & Lincoln, 1995).

Gall, Borg, and Gall (1996) state that archived text, or journals, offer accurate perspectives of participants at a specific time, eliminating any change of perspective due to post-phenomenon experiences. The journals of the students were accessed and analyzed for themes related to the established objectives.

In qualitative studies, data analysis refers to the categorizing and ordering of information in such a way as to make sense and to report findings that are factual and correct (Brink, 1991). However, one limitation is that sampling techniques used in qualitative studies do not allow application of findings outside of the participants.

According to Benner (1985), data can be put together by category. This is called axial coding. After the data is axially coded, it can be put into core categories, or selectively coded, to develop themes that relate to the research at hand (Strauss & Corbin, 1990). This study used such coding, resulting in the development of themes. Once the data was openly coded, axially coded, and selectively coded, emergent themes were documented and listed in order of pervasiveness.

Control measures are necessary to assure the truthfulness of the results presented. The usual measures of validity and reliability generally accepted in quantitative research are not appropriate for use in phenomenological studies. Nevertheless, steps to minimize errors of interpretation and to control interpretive bias remain important. Qualitative research methods have controls of reliability and validity built into the study design. In this research, journal entries were read and analyzed by multiple researchers and participant observation was utilized (Patton, 2002).

Triangulation was used in the design of this study. Emergent themes from the individual student journals were compared. In addition, each the three authors of this paper coded all journals to ensure data accuracy. This eliminated weak themes from being used as emergent themes in the findings.

There were 17 journals evaluated and the student authors were kept anonymous, using single letters unrelated to their name to provide an audit trail if needed. These are identified in the following text using the symbol “(X)” to identify the individual author. The journals were from the 2005 and 2006 program and all but one student journal was evaluated. The one journal was eliminated as the student did not follow the same instructions and completed all writing after completing the trip. For the purposes of the first phase of this research, only pre- and post-reflection essays program
were coded. The prompts for these essays were identical in both instances and therefore provided more consistent reflection responses. They were developed by the Morgan Mercer, the service-learning coordinator for Texas Tech University. The prompts were as follows:

Service-Learning Pre-Reflection Essay Questions:
- What elements make up an effective community-based eco-tourism venue?
- What is the value of collaborating with cultural communities in the design process?
- What is the landscape architect’s role in conservation?
- How does a landscape architect contribute to the world around him or her?
- What am I excited and/or worried about regarding the community projects?
- Overall, what do I hope to gain from this experience?

Service-Learning Post Reflection Essay Questions:
- How did partnering with cultural communities enhance the design process? Use specific examples from your experiences in Yaxunah and Yaxhachen as well as any partnership values you felt were particularly important.
- Based on your experiences over the past few weeks, has your opinion of how a landscape architect professionally contributes to the world around him/her changed? Do you consider professional contributions a service? Explain why or why not.
- Refer to your fears and excitements about working with the community you wrote in the pre-reflection essay. How did your community experiences confirm or deny your initial anticipations?
- Overall, what do you feel you have gained from this experience? List three things.

Results
The three reviewers determined that the five dominant themes found in the students’ writing, in order of most to least dominant, were (1) the interaction between design and people, (2) the role of the landscape architectural profession, (3) interaction between design and culture, (4) personal growth, and (5) communication issues.

Communication (5) included both verbal and non-verbal issues and discussion on overcoming the language barrier. One student wrote, “My fear of the communication gap was evident, but graphics came in handy. So much so I was surprised.” (R) Another noted that the program improved his/her skills when working with a group, and a third, who
spoke Spanish, reflected on how translating improved his/her language skills (H).

Personal growth (4) for many students included writings in both the pre- and post-reflection essays. For example one individual wrote,

I have been looking forward to this trip because it has given me the chance to get away from the craziness of my family & school; to leave me alone with my thoughts about what I really want out of my life & schooling. As a landscape architect, I hope to learn more, especially from the other students. (Q)

Personal growth was also a theme in the post-reflection essays as many students noted that the trip had improved their self-confidence, such as the student who wrote, “My fear of not knowing what I was doing soon proved unfounded and with a little bit of help, I was able to truly contribute.” (D) Personal growth also involved the numerous statements of gratitude for what they have and often take for granted as Americans.

The interaction between design and culture (3) provided for some very interesting insights, especially when considering that culture can include social, historical and environmental issues. A typical observation was as follows

When I first came, I thought these people can barely afford to feed themselves, how can they afford a nicely landscaped house or plaza? By the end, I saw that they cared much more for other things, like the social interaction they got in a plaza, than the plaza itself and that also amazed and inspired me. (L)

Another cultural observation with regard to design was, “Using culture as a main design element would reflect the values of the community and make it theirs.” (N) From an environmental standpoint there was a general consensus that landscape architects should be the leaders in conservation of natural resources and environmentally sensitive areas.

The role of the landscape architectural profession (2) included many statements concerning the changed or confirmed views of the profession. These included, in many cases, a broadened view of the professionals’ role in society. Some examples were:

I feel that landscape architects have a lot more to offer than what I originally thought. The service that we can provide a community or client is endless. I have found new areas of landscape architecture that I might want to pursue. (K)

Over the past few weeks I have learned that landscape architects can play a bigger role than I ever imagined. The decisions we make affect everything around us. (A)

These past few weeks [have] helped me realize that when I get my diploma I will be contributing to the world in all sorts of different ways. (H)

(It is interesting to note that the last quote is from an individual who had been on academic probation the year before attending the program and earned a 3.5 GPA the semester immediately following the trip.)

The interaction between design and people (1) differed from the cultural theme in that it dealt primarily with the impact that landscape architecture can have on individuals and communities. Many students commented on how helpful it was to have a real site with real clients. One commented on how measuring and drawing the base plan helped him understand the site better. The author observed that the students gallantly struggled with what would normally have been the simple task of measuring and making a plan since they had to deal with the metric system, and measurements as well as site features called
Another student mentioned how helpful it was to meet with the client at what was a very different site than what they, as students, were used to seeing. Many expressed how important it was to have interacted with the community and ultimate users of the sites in order to understand how individuals perceive and use their public space.

Meeting with the different committees in Yaxunah really helped us to get a good understanding of how they functioned in their daily lives and what they wanted most to improve their community. Meeting with both the men and women of Yaxhachen really helped us to understand how to design a park that would benefit both. They all had such different opinions for the park; it was so interesting to hear their ideas. If we had not met with these communities I do not feel that we would have received as much from this experience and our designs would have not been as beneficial to the villages. (P)

Perhaps the most profound comment came from a non-landscape architecture major who wrote:

Over the last weeks I have been thoroughly impressed by the landscape architects, the work they do and how they greatly affect the world around them. The tools that this [profession] possesses must be used to the fullest to insure that the growing population on earth and its urban centers are well planned and arranged to allow for a higher quality life for its citizens. (J)

The previous themes and supporting statements demonstrate that including a service-learning component in the study abroad program greatly enhanced the students’ learning experience. It helped change and form attitudes toward the profession, the people and cultures it serves and their own individual self-respect.

When evaluating the students’ journaling activities against the five levels of the taxonomy of the affective domain, even greater levels of learning and benefit were revealed. The five levels, in increasing order are: Receiving, Responding, Valuing, Organizing, and Characterizing.

Receiving and responding are the two most basic levels of affective learning and are what are expected in a typical classroom setting (Boyd, Dooley, and Felton, 2006). At this level, students are expected to have received information and are to some extent willing to participate and/or accept the information or activity. They are the first stage in the “learning by doing process” (Krathwohl, et al., p. 178). Examples from the students’ writings included the following:

I hope to gain a wider knowledge of being able to please others (other cultures) in my design and to learn to take into [account] everything I see in my traveling to better equip myself for adjusting my views quicker and being able to adapt and change faster and more accurately to what is needed from me and not what I think they need. (S)

The previous individual essentially recited the essence of the program in general, has expressed a willingness to receive and respond, but has not necessarily expressed any value to the activity.

Valuing involves an expression of increased worth. At this level, the individual has committed to the concept, internalized it, and adopted it as his/her own. Examples included:

A landscape architect has a responsibility to care for the land…For myself it means the study of incorporating the concept of sustainable development whenever feasible. (D)

In my opinion the role of the landscape architect is not only to construct but sustain as well. We should plan to design not only for the present but for the future...
as well and sometimes we tend to forget that our role as conservationists is very important…. (E)

Organizing involves “(a) the organization of the value into a system, (b) the determination of the interrelationships among them, and (c) the establishment of the dominant and pervasive ones” (Krathwohl, et al., p. 182). In many cases, the students’ writing demonstrated a transfer or comparison of values to their own or other personal situations. Examples include the following:

Working with different cultures in the design process seems as if it would allow one to expand [his/her] horizons. For example, in the U.S. we live a certain way and [are] raised a certain way; it is all we know. However, there is so much more we do not know and many ways to do things. A culture is a culture but no two are alike. By working with others we not only get new ideas, methods, etc, but are able to see the similarities as well. In a sense it seems as if it is not only expanding oneself but uniting different people as well. (E)

So many great things have already come from collaborating with cultural communities, such as medicines, food, history, inventions, etc. So why should we stop there? We should seek other people’s views even though they may not be the same as our own. (R)

Characterizing is the highest level of affective learning and involves “the integration of those beliefs, ideas, and attitudes into a total philosophy or world view” (Krathwohl, et al., p. 184). This level of writing produced some of the most profound statements and demonstrated the writer’s ability to take what is learned or experienced and adapt it to his or her own view of the world. Examples were

By living in the villages of the Yucatan I gained a new interpretation of the value of time and how it corresponds with life. ‘Hay mas tiempo que vida’ [there is more time than life] is nearly the motto of many of them. (J)

‘Poor’ is a rich man’s word, and getting to interact with these communities helped me see that. The places we visited are “rich” in their culture, family values, history, etc. and are far from poor. (R)

After reviewing and categorizing the students’ journal writings in terms of the affective domain, the apparent levels of writing from the pre-reflection essays were compared with the post-reflection essays. In almost every case, there was a far greater instance of Organizing and Characterizing in the post-reflection activity. This suggests that the students were highly motivated by both the study abroad experience, as well as the service-learning experience. Their writing demonstrates a profound sense of civic, social and cultural awareness. Although the students’ daily journaling was not formally analyzed, the general perception from a cursory review is that they confirm the increased level of affective learning.

**Educational Importance**

Lewis and Niesenbaum (2005), in their research on short-term study abroad programs, do not advocate “touristic” experiences. Ecotourism and community-based ecotourism specifically provides an excellent opportunity for students to visit and study in a foreign country and avoid the mass tourist destinations that often overwhelm a civilization’s culture, history, and natural settings. Cancun is an obvious example. Lewis and Niesenbaum (2005) further emphasize the promotion of “integrated experiences, including linking the experience to course work, engaging students in a specific community via community-based research and service-learning and teaching students how to use...
research skills through interdisciplinary research topics” (p. 257). Working with local communities offers just such an opportunity to connect with specific communities. It also offers the rare opportunity for U.S. landscape architecture students to meet and collaborate with both Mexican and U.S. anthropologists who, in some cases, have been working with the communities for over ten years.

The community-based ecotourism studio project incorporated community design in a cultural and environmental context and provided an intensive learning experience for the U.S. landscape architecture students. The theme is one that lends itself well to a study abroad experience; much more so than the traditional classroom/studio setting. It offered the opportunity for students to work for a client that was looking to solve social issues rather than just design another pretty picture. It demonstrated to the students the power that the design process has to improve people’s lives, as well as the social and civic condition.

Evaluating the program through the analysis of the students’ journaling activities proved to be very enlightening. It also provided insights for improvements. For example, a minimal level of group discussion during the trip would help the students become more aware of what is happening around them. It would help them focus their writing and help dispel any misconceptions that may arise from unfamiliar cultural or environmental encounters.

An opportunity for future evaluation of the program exists in the analysis of the students’ daily journaling rather than evaluating only the answers to the specific questions. Since they are much more extensive, it would take a considerable amount of time and resources. However, a preliminary reading seems to indicate that there is a point midway through the trip at which the writing takes a significant jump in the level of writing. The addition of the daily journaling would also help overcome the small sampling from which the qualitative research is based by provide a larger amount of data to analyze.

**References**


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