

DEVELOPING, IMPLEMENTING, ASSESSING, AND EVALUATING
SERVICE-LEARNING IN ENTOMOLOGY

by

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(Under the Direction of Ray Noblet)

ABSTRACT

Insects are ideal models for demonstrating a broad array of biological and ecological concepts while providing opportunities to focus on the application of biology to solve real-world problems in local communities, and the international community. Service-learning and study-abroad opportunities are critical components for creating an environment of increased academic engagement for undergraduate students at the University of Georgia. Service-learning, an experiential pedagogy, engages students and faculty to participate actively in their surrounding communities in educationally meaningful ways by creating an environment of active learning while bringing entomology to the public. Mutually beneficial and sustainable projects with community partners allow students to solve local problems through first-hand experiences. Integrating service-learning into the entomology curriculum at UGA provides students an opportunity to participate in developing and implementing entomological programs for the community both domestically and internationally. The first objective of this study was to develop, implement, assess and evaluate service-learning courses in entomology. The second objective was to examine the effects of service-learning on student's civic outcomes. In 2006, two service-learning courses were created in the Department of Entomology, *Outreach and*

Service-Learning (ENTO 3900) and *Insect Natural History in Costa Rica: International Service-Learning* (ENTO 3140-3140L). To evaluate effectively these two service-learning courses in entomology at UGA, a triangulated mixed method design was chosen using simultaneously collected qualitative and quantitative data. Results suggest that service-learning enhances students' interest in science, teaching, communication, and civic skills. Service-learning courses integrated with community outreach programs were implemented both domestically and abroad.

INDEX WORDS: Service-learning, Entomology, Study Abroad, Pedagogy, Community Outreach

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DEDICATION

This is dedicated to my children, Paul Shockley Stephens (Paul) and Katherine Leenora Stephens (Nora). Thank you for your unconditional love...

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CHAPTER 1

INTRODUCTION

The Current Research Initiative

To date, there have been no publications about service-learning in entomology. Pedagogical methods of teaching entomology in higher education such as service-learning are examined in this dissertation. Insects are readily available and easily manageable subjects for the study of biological principles and processes ranging from genetics and reproduction to behavior, ecology, and environmental and socioeconomic impacts in daily life. A mutually beneficial relationship exists between institutions of higher education and their communities. Prioritizing multicultural literacy, civic engagement, and education/experience through entomological service-learning could be of tremendous benefit to our students' futures. Service-learning, an experiential pedagogy, engages students and faculty to participate actively in their surrounding communities in educationally meaningful ways. Insects are ideal models for service-learning initiatives and provide unique opportunities to focus on the application of biology to solve real-world problems in local communities and the international community at large.

Critical components for creating an environment of increased academic engagement at UGA include service-learning and study-abroad opportunities for undergraduate students. Goals and objectives of service-learning in entomology include:

- Improve science experiences and content knowledge through entomological hands-on science programs;
- Provide experiences for students and teachers that bring about more positive attitudes about science and insects;

- Develop a sense of community involvement for students and teachers;
- Enhance the communication and leadership skills of students;
- Increase civic engagement of students.

In 2006, two service-learning courses were created in the Department of Entomology at UGA, *Outreach and Service-Learning* (ENTO 3900) and *Insect Natural History in Costa Rica: International Service-Learning* (ENTO 3140-3140L). The primary purpose of this study was to develop, implement, assess and evaluate science service-learning in entomology. In order to evaluate effectively these two service-learning courses in entomology a triangulated mixed method design was chosen using simultaneously collected qualitative and quantitative data. Specific research questions addressed included:

1. What is the status and distribution of domestic and international service-learning in Entomology programs nationwide?
2. How are domestic and international service-learning courses developed and implemented in the entomology curriculum at UGA?
3. What are learning outcomes associated with *Entomology Outreach and Service-Learning*?
4. What impacts are associated with entomological outreach education for entomology graduate students, undergraduate students, and community partners?
5. Does participating in science service-learning (domestically and internationally) affect students' civic outcomes?

Ultimately, this research will provide findings about the capacity of science service-learning in entomology, both locally and abroad, to influence students' views, attitudes and behaviors regarding civic engagement, teaching and learning. Further, how these changed views are associated with academic achievement and the various components inherent to service-learning courses which are significant in bringing about desired outcomes will be better understood. By combining the quantitative pre and post semester survey data and the views expressed in our reflection interviews. The statistical data and student voice will provide some useful insights into outcomes associated with service-learning.

Overview of the Current Efforts

This dissertation will provide a synthesis of my attempts to investigate the research questions outlined above. In investigating research question one, sixty-five Entomology Department Head and Unit Administrators (CEDA) were surveyed using a quantitative and qualitative instrument (Appendix A). The results of this survey demonstrate the present state of service-learning in Entomology departments and units throughout the United States.

For investigating research questions two and three, qualitative data in the form of journal entries, course-related reflection activities, and final reflective summaries from fifty-nine students enrolled in *Entomology Outreach and Service-Learning* and *Insect Natural History in Costa Rica* from Spring 2006 to Summer 2008 was analyzed.

In investigating research question four, I relied on qualitative and quantitative data in the form of open and closed ended surveys. Participants included community partners, entomology undergraduate students, students enrolled in the entomology service-learning courses, and entomology graduate students.

Research question five addressed the issue of whether or not students' civic outcomes were affected by participating in a science service-learning class. A pre and post quantitative design was employed with a forty-two item Likert-scale instrument which asked students to report attitudes and behaviors related to civic knowledge and skills, social responsibility, interpersonal growth, time management and future intentions of being involved in service-learning. Participants for the quantitative portion include students enrolled in two entomology service-learning courses at UGA, ENTO 3900, *Entomology Outreach and Service-Learning* and ENTO 3140, *Insect Natural History in Costa Rica* and students enrolled in a college service-learning course AESC 4920/6920, *Project Focus*.

In Chapter 2 of this dissertation, a review which synthesizes literature from a range of service-learning areas is presented. Next, I examine the need for improvement in undergraduate education in the Science, Technology, Engineering and Mathematics (STEM) disciplines and suggest service-learning as a pedagogy towards this improvement goal was then examined. Following, literature about assessment, evaluation and civic engagement is reviewed. Chapter 3 discusses, and provides details about research methods and data collection utilized in this dissertation. In Chapter 4 of this dissertation I address course development and implementation of *Entomology Outreach and Service-Learning* and an international service-learning course, *Insect Natural History in Costa Rica*. The apiary service-learning project and the outdoor classroom project are also discussed. We also review data from undergraduates, graduates and the community about the entomology outreach program and evaluate learning outcomes associated with *Entomology Outreach and Service-Learning*. Chapter 5 examines the effects of service-learning on civic engagement. Finally, in Chapter 6 of this dissertation, I provide a summary of this document and detail implications for research in service-learning that are supported by my findings.

Service-learning enhances student learning through active academic engagement by bridging theory and practice. Science service-learning has the potential to enhance a student's interest in science, improve teaching communication skills, and positively affect interpersonal and civic skills not typically developed in science students at research institutions. By successfully incorporating a service-learning component with entomologically-based community outreach programs, the Department of Entomology seeks to serve as a model inducing mutually beneficial permanent changes in science programs at UGA and beyond.

CHAPTER 2

LITERATURE REVIEW

Service-Learning in Higher Education

Service-learning has been defined as “an educational practice that has been used successfully in many disciplines, and is a credit-bearing, educational experience in which students participate in an organized service activity that meets pre-determined community needs where students reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility” (Bringle and Hatcher 1995). Jacoby et al. (1996) defined service-learning as “a form of experiential education in which students engage in activities that address human and community needs together with structured opportunities intentionally designed to promote student learning and development” where both reflection and reciprocity are key concepts of service-learning. Service-learning can provide a dynamic context in which to resolve challenges to old views and apply new information and skills. Understanding is enhanced by active use of information and reflective instruction that encourages students to question preconceptions and adjust the way they think about the subject to facilitate greater understanding. In order to test adequately for understanding, it is important to know how students identify and describe complex problems, and how they use their skills and knowledge in offering possible solutions to those problems (Eyler and Giles 1999).

As a form of experiential education, service-learning has its roots in Dewey’s 1938 theory of experience, which has become the philosophical benchmark of the experiential

movement. These roots continue to shape how service-learning is viewed and understood. When viewed as helping those “less fortunate”, students may not see the role that their own privilege plays in the dynamics of power (McIntosh 1989). T. Frederick Rudolph (1962) noted that “From the beginning, the American college was cloaked with a public purpose, with a responsibility to the past and the present and the future”. Along with internships, cooperative education, and other forms of experiential learning, service-learning established itself and flourished on many college campuses in the late 1960s and the 1970s (Jacoby et al. 1996).

A survey of the literature finds numerous definitions of service-learning. Several of these include Kendall (1990) who wrote that there were 147 definitions in the literature, Furco (1996) defined service-learning as a form of experiential education whose pedagogy rests on principles Dewey and other experiential learning theorists established early in this century, Eyler and Giles (1999) discussed how learning occurs through a cycle of action and reflection, not through recounting what has been learned through reading and lecture. Experience enhances understanding; understanding leads to more effective action where both learning and service are valued and transformed when combined in activities and programs called service-learning (Eyler and Giles 1999).

Service-learning is active learning that addresses real-world problems (Schon 1995). More traditional pedagogical strategies of lecture and discussion can be transformed with a goal of improving education by integrating service-learning into instruction. Zlotkowski (1998) described service-learning as pedagogy where “the classroom is linked to the world, allowing induction to complement deduction, personal discovery to challenge received truths, immediate experience to balance generalizations and abstract theory”. In and through service-learning, students learn to engage in defining and solving problems in a genuinely powerful way. Service-

learning also bridges theory to knowledge as civic responsibility and public work (Boyte and Farr 1997). Students at all levels can discover the importance of addressing community and individuals needs. Problem-based learning, collaborative learning, undergraduate research, critical thinking, multiculturalism and diversity, civic awareness, leadership skills, and professional and social responsibility are all associated with service-learning programs (Zlotkowski 1998).

Billig and Furco (2002) described service-learning as “an approach to teaching and learning that involves having students perform community service as a means for achieving academic goals”. Zlotkowski (1998) describes service-learning as “a credit bearing educational experience in which students participate in an organized service activity that meets identified community needs and reflect on the service activity in such a way as to gain further understanding of the course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility”. Service-learning involves participants from both academia and the community and can be studied in many or most disciplines with a variety of program outcomes. Through service-learning students can develop effective civic related skills, allowing faculty and enabling administrators to address complex community needs and build partnerships (Bringle and Hatcher 1996).

Service-learning in higher education is a potentially transformative pedagogical practice and theoretical orientation. Service-learning inspires by moving against the grain of traditional practice in higher education. “It is a deeply engaging, local, and impactful practice (Butin 2005)”. The emphasis in service-learning on applying knowledge to community problems and the reciprocal application of community experience to the development of knowledge address major concerns about the lack of connectedness in higher education (Eyler and Giles 1999). In

1979, Robert Sigmon, one of the early leaders in these endeavors, drafted three service-learning principles: (1) Those being served control the service(s) provided; (2) become better able to serve and be served by their actions; (3) are learners and have significant control over what is expected to be learned. Porter Honnet and Poulsen (1989) state that an effective and sustained program:

1. Engages people in responsible and challenging actions for the common good.
2. Provides structured opportunities for people to reflect critically on their service experience.
3. Articulates clear service and learning goals for everyone involved.
4. Allows for those with needs to define those needs.
5. Clarifies the responsibilities of each person and organization involved.
6. Matches service providers and service needs through a process that recognized changing circumstances.
7. Expects genuine, active, and sustained, organizational commitment.
8. Includes training, supervision, monitoring, support, recognition, and evaluation to meet service and learning goals.
9. Insures that the time commitment for service and learning is flexible, appropriate, and in the best interests of all involved.
10. Commits to program participation by and with diverse populations

These guiding principles of service-learning lead to the understanding of ethical concerns, which are always a primary focus for partners including faculty, students and community partners. Chapedelaine (2005) identified ethical principles of “beneficence, justice/fairness/equity, fidelity/responsibility, autonomy and respect for people’s rights and integrity” that should be considered when working in the community.

Various service-learning programs target different types of learning goals of intellectual, civic, ethical, moral, cross-cultural, career, or personal growth. Service-learning programs also promote learning about larger social issues. A deeper understanding of the historical, sociological, cultural, economic, and political contexts of the needs or issues being addressed is achieved (Kendall 1990). A critical and essential element of reflection occurs in several forms;

individual or group, oral or written, and may or may not be directly related to discipline-based course material. Reflection is designed to focus on various learning outcomes and uses an assortment of methodologies (Jacoby et al. 1996).

Another element of service-learning is reciprocity and the concept of the program being mutually beneficial. “All parties in service-learning are learners and help determine what is to be learned. Both the server and those served teach, and both learn” (Kendall 1990). The needs of the community define what the service tasks will be. Reciprocity allows students to develop a sense of belonging and a greater responsibility as members of a larger community. Service-learning focuses on tasks to meet human and community needs in combination with “intentional learning goals and with conscious reflection and critical analysis” (Kendall 1990). Tasks may be direct or indirect services. Service-learning encompasses evaluation of its effects on students, as well as on individuals and communities served (Jacoby et al. 1996).

To address the need for research in service-learning, the *Michigan Journal of Community Service Learning* was launched in fall 1994. Campus Compact is a “national coalition of more than 1,100 college and university presidents - representing some 6 million students - dedicated to promoting community service, civic engagement, and service-learning in higher education” (Campus Compact 2009). Campus Compact is also a very crucial source of resources related to service-learning. National conferences and regular publications of many higher education associations whose primary focus is not service-learning or experiential education have, however, featured speakers and articles on service-learning. Also, the federal government’s interest in and support of service-learning increased substantially in the 1990s with the passage of the National and Community Service Trust Act of 1990. As a result, the Commission on National and Community Service and the newly established National Civilian Community Corps

merged to form the Corporation for National and Community Service, generally referred to as the Corporation for National Service.

The application of academic knowledge cannot depend solely on well developed cognitive and social skills. It is becoming more apparent and critical that students must acquire a set of transferable skills rather than prepare for a single lifelong career. Service-learning opportunities allow students to develop necessary life skills of synthesizing information, creatively solving problems, constructively team working, effectively communicating, applying decision making skills, and appropriately using abilities for negotiating and compromising. Other qualities that can be developed through service-learning are initiative, flexibility and adaptability, openness, and empathy (Jacoby et al. 1996).

Silberman (2007) examined the use of experiential activity in changing attitudes and behaviors. He identified five steps necessary for this change to occur: 1) creating openness, 2) promoting understanding, 3) considering new attitudes and behaviors, 4) experimenting, and 5) obtaining support. As a form of experiential learning, action learning is a process that involves a small group working on real problems, taking action, and learning as individuals, a team, and an organization. Marquardt (2007) also describes various components that must be present for experiential learning to occur: 1) a problem (project, challenge, opportunity, issue, or task), 2) an action learning group or team, 3) a process that emphasizes insightful questioning and reflective listening, 4) taking action on the problem, 5) a commitment to learning and 6) an action learning coach. Many of the steps for experiential and action learning can also be observed and are necessary elements of developing and implementing service-learning projects, programs or courses. Once these steps have been identified and the project has been implemented, the project, program or courses must be evaluated and assessed for their effectiveness.

Casey et al. (2006) describe service-learning as “not only a pedagogy, but a means to empower students and educational institutions to become more aware of the needs of the communities of which they are a part and to become engaged and civically active in mutually beneficial ways”. Evidence is beginning to show that service-learning has not only begun to transform education, but it also has transformed the lives of many of the students involved. Clark and Young (2005) discuss the proliferation of service-learning across the 1990s and into the new millennium on college and university campuses. Without reflective activities that require students to connect their experiences in service programs to their classroom work, service-learning becomes, at best, volunteerism or at worst, logging of hours toward a community service requirement.

Service-learning is also conceptual. When seen as only experiential, the focus remains primarily on students, themselves, and what they “get” out of a service-learning experience (Kendall 1990). Service-learning has been framed by theories that attend to issues of civic participation (Barber 1992). However, while one outcome of such work is service to the community, the central focus is on the students themselves and on producing and reproducing citizens.

More recently, approaches to service-learning have been informed by critical theory and pedagogy (Freire 1970; McLaren 2003). The focus is on issues of teaching and learning, including service-learning. Applying such theories to service-learning work encourages students to focus their attention toward activism and social justice. Reciprocity, mutual learning, and shared benefits across student participants and community members are important, however, the ultimate focus is still on transforming the perspectives and worldviews of students.

There are multiple benefits of using service-learning in the curriculum at institutions of higher education as described in *Service-Learning and Communication: A Disciplinary Toolkit*:

1. Service-learning connects theory and practice (Eyler and Giles 1999; Markus et al. 1993).
2. Service-learning helps students gain a sense of community and responsibility for others (Driscoll et al. 1996; Barber et al. 1997).
3. Service-learning promotes active learning (Sledge et al. 1993).
4. Service-learning teaches problem-solving and critical thinking (Alliance for Service-Learning in Education Reform 1993; Batchelder and Root 1994).
5. Service-learning promotes collaborative learning (Rhoads 1997; Astin and Sax 1998).
6. Service-learning reduces stereotyping and facilitates intercultural understanding (Greene and Diehm 1995; Ostrow 1995).
7. Service-learning helps colleges and universities stay true to their missions.
8. Service-learning contributes to resume and career development.
9. Service-learning improves student satisfaction with college and builds stronger relationships with faculty members (Berson and Younkin 1998; Eyler and Giles 1999).

Waterman (1997) also described several benefits from participating in service-learning: (a) enhancing learning through action, (b) promoting personal development, (c) fostering civic responsibility, and (d) contributing to the community.

Various studies of the effects of active and service-learning on engagement, retention, inquiry, student learning and critical thinking generally show positive effects on outcomes of interest (Quigley et al. 2002; Hu et al. 2008; Carini et al. 2006; Miller and Ewell 2005; Reed et al. 2005; Duron et al. 2006). In a study by Gallini and Moely (2003), undergraduate students evaluating their service-learning courses were more likely than students evaluating other courses to report that the courses promoted interpersonal, community, and academic engagement, were academically challenging, and encouraged continued study at the university (retention). A mediation model showed that the academic challenge of the courses and the students' engagement with course content were most important in determining the influence of service-learning courses on plans to continue study at the university.

Carini et al. (2006) noted that the complex relationships between engagement and learning outcomes depended on being able to analyze student-level data across multiple institutions. The results of this study illustrate the insights that can accrue from such collaborative research endeavors. Reed et al. (2005) examined the effects of a small-scale, very short-term (eight to ten hours) service-learning experience on college undergraduates. Repeated measures analysis of variance indicated that students participating in this experience reported maintenance of their sense of social responsibility, an increased sense of the meaningfulness of college, and an increased likelihood of choosing a service-related occupation, when compared to non-participating matched counterparts. These findings provide support for the idea that minimally resource-intensive service-learning programs can provide students with some of the benefits of service-learning that have been identified in longer, more intensive experiences (Reed et al. 2005).

Astin in *Where's the Learning in Service-Learning* (1999) describes how advocates of service-learning often emphasize its "service" benefits. Perhaps equally or more important, is its great potential for enhancing the learning process. Cognitive learning and affective service can be closely connected. They can be mutually reinforcing and an affective outcome, like commitment to service, also has important cognitive components. Service-learning must include a balance between service to the community and academic learning with reflection. The American Association for Higher Education (AAHE) has made service-learning a focus of conferences and has issued a series of monographs that presents models, research, theory, and syllabi for service-learning in particular disciplines (Eyler and Giles 1999).

Service-learning programs that place students in contexts where their prejudices, previous experiences, and assumptions about the world are challenged may create the circumstances

necessary for growth. Service-learning programs that create this cognitive dissonance and also provide the structure in which to confront the challenge and seek further information and experience to arrive at solutions provide conditions consistent with what is known about improved cognitive development and problem solving (King and Kitchener, 1994; Lynch 1996; Perry 1970). Critical thinking ability is another important academic outcome of higher education that may be affected by service-learning (Eyler and Giles 1999).

Community experiences that challenge student assumptions coupled with thoughtful reflection may lead to fundamental changes in the way the student views service and society. We would not expect most students to have experiences powerful enough to transform, but where programs engage students in important work in the community and provide continuous opportunities for reflection, service-learning may be a catalyst for a dramatic redirection of their lives (Eyler and Giles 1999).

In *Service-Learning as Postmodern Pedagogy*, Butin (2005) establishes four distinct conceptualizations of service-learning – technical, cultural, political, and postmodern. Carefully designed service-learning experiences can lead to profound learning and developmental outcomes for students, and is the primary reason that institutions of higher education engage in service-learning. Understanding the potential learning and developmental outcomes of service-learning enable service-learning educators to shape desired outcomes and design service and reflection experiences to achieve them. Learning and personal development naturally complement each other in service-learning and in other experiential and classroom activities which can be enhanced through intentional planning and course or program design (Jacoby et al. 1996). Cantor (1995) describes experiential learning as “a process of learning and a method of

instruction where experiential education refers to learning activities that engage the learner directly in the phenomena being studied”.

Butin (2006) examines the limits of service-learning in higher education suggesting “that there are substantial pedagogical, political, and institutional limits to service-learning across the academy”. Service-learning has immense transformational potential as a sustained, immersive, and consequential pedagogical practice (Butin 2005a). Butin’s analysis reveals some of the fundamental and underlying assumptions of the service-learning field (2006). He then shows how these assumptions imply significant pedagogical, political, and institutional impediments for the authentic institutionalization of service-learning. Butin then suggests how a reframing of such assumptions may allow service-learning to be repositioned as a disciplinary field more suitable for becoming deeply embedded in higher education.

Butin (2005) discusses how “service-learning appears ideally situated to make an impact in the classroom and in the world. Combining theory with practice, classrooms with communities, the cognitive with the affective, service-learning seemingly breaches the bifurcation of lofty academics with the lived reality of everyday life”. Student immersion into communities has relevant and consequential learning outcomes, and profound respect for and attention to the process of engaging all service-learning participants (Butin 2005).

Institutionalization of service-learning is receiving more attention in the literature as more universities and colleges begin incorporating and integrating service-learning into their programs nationwide. In an effort to determine if institutionalization has occurred, Bringle and Hatcher (2000) identified four associated factors of service-learning in higher education:

1. Conducting regular strategic planning.
2. Establishing and developing a centralized office to recruit and develop each of the four constituencies.

3. Increasing institutional budget commitments to support the development of service-learning.
4. Vesting the commitment to service-learning with leadership that establishes and maintains its academic integrity.

Any institution engaged in service-learning can use Bringle and Hatcher's model to either promote or sustain service-learning programs on their respective campuses.

Service-Learning at the University of Georgia

At the University of Georgia, special attention is being given to either form or strengthen collaborations between the public service units and academic units related to service-learning and civic engagement, and to create student and faculty opportunities for academically grounded, service-learning experiences in developing countries" (UGA Public Service and Outreach, 2008). Hollander et al. (2002) identified ten indicators of engagement including:

1. Pedagogy and epistemology
2. Faculty development
3. Enabling mechanisms
4. Internal resource allocation
5. External resource allocation
6. Faculty roles and rewards
7. Disciplines, department, interdisciplinary
8. Community voice
9. Administrative and academic leadership
10. Mission and purpose

The National Survey of Student Engagement (NSSE) was conducted in spring 2003 for first- and fourth-year UGA students. Interestingly, when responses were compared to those students in other post-secondary institutions, UGA first-year students said they participated in fewer "community-based projects" but had higher expectations that they would do so before graduation. With this in mind, the Civic Engagement Initiative was proposed by The Office of the Vice President for Public Service and Outreach which supports programs that strengthen the

connections between the tri-fold mission of UGA (teaching, research, and outreach). The goal is also to meet society's needs by encouraging the scholarship of engagement by faculty members, and by providing service-learning opportunities for students. During the 2002-2003 academic years, the Office of the Vice President for Public Service and Outreach partnered with the Office of the Vice President for Instruction to create the Office of Service-Learning at UGA. As a result, the Office of Service-Learning was established on July 1, 2005. This office is charged with coordinating, promoting, and expanding service-learning initiatives across campus. The goal of the Office of Service-Learning is to provide campus-wide support to faculty members who wish to develop academic service-learning opportunities for UGA students.

The 2005 Report of the Task Force on General Education and Student Learning at the UGA recommended that a student educated at the University of Georgia should also develop these certain abilities:

- Engage in complex thought, analysis, and reasoning
- Communicate effectively in both speech and writing
- Appreciate lifelong learning and community service
- Understand the world through foreign languages and international experiences
- Reason quantitatively
- Learn collaboratively
- Appreciate and engage diversity in the University and the community at large

Most of these abilities are emphasized in service-learning. The Office of Service-Learning (OSL) now provides campus-wide support of service-learning initiatives at UGA and seeks to incorporate strategically the aforementioned abilities into the university curriculum through service-learning courses.

While examining the institutionalization of service-learning at UGA according to these ten indicators of engagement, it is clear that the current culture of service-learning on UGA's campus is one of a thoughtful and engaged campus community. Each of the ten indicators can

be individually identified with programs on the UGA campus. These programs include monthly Service-Learning Interest Group (SLIG) meetings, the Service-Learning Fellows Program for faculty development, seed grants and annual engagement awards from OVPPSO, administrative and academic leadership in the Office of Service-Learning and discipline based as well as interdisciplinary service-learning programs throughout campus.

Entomology Outreach at the University of Georgia

The H.O. Lund Entomology Student Club is a service and socially-oriented student organization comprised of entomology undergraduate and graduate students at the University of Georgia. The history of the Lund Club dates back to 1961 with the formation of Alpha Mu Epsilon (AME). The purpose of AME was to “encourage and increase interest and study in entomology, and to keep its members informed of current news and activities in the field”. The club officially changed its name to the “H.O. Lund Entomology Club” in the late 1970’s in honor of Dr. H. O. Lund who was the first department head of the Department of Entomology.

The purpose of the Lund Club is entomological educational community outreach programs with the Insect Zoo to local schools, organizations and UGA events in Athens-Clarke County (GA) and the surrounding counties. The Insect Zoo consists of live and preserved insects and arthropods and is maintained by students in the H.O. Lund Club. Prior to 2006 when the first formal *Entomology Outreach & Service-Learning* (ENTO 3900) course was offered which integrated the Lund Club’s historically successful outreach program and Insect Zoo with academic credit, no formal course was associated with the Lund Club’s outreach activities. Until that point the program was coordinated by graduate students and participants were recruited on a voluntary basis. Even though the program was voluntary and not associated with a formal course, students involved in the program learned through actively teaching others about

entomology, conveying their knowledge of insects and related arthropods to the public and by encouraging children to pursue their interests in science.

The Insect Zoo travels by request to local schools and events where children, and their parents and teachers, interact with the insects and arthropods in a safe environment to learn about the importance of insects. Besides local school outreaches, members participating also volunteer at various large-scale annual events including the annual Insectival at the Georgia State Botanical Garden and the UGA South Campus Tailgate each fall, an Insect Zoo in conjunction with the Georgia State Science and Engineering Fair each spring, and various events at museums (Fernbank, Atlanta), nature centers (Sandy Creek Nature Center, Athens) and parks (Memorial Park, Athens). Annually the Insect Zoo's outreach programs interact with over 10,000 Georgians and have generated positive community publicity for UGA and the Department of Entomology.

Requests are made by the community for outreach events through the Insect Zoo's website. Prior to 2006 all programs were conducted on a voluntary basis. The need and requests for entomology community outreach programs far exceeded the capacity of the student volunteers. Spring semester 2006, *Entomology Outreach and Service-Learning* (ENTO 3900) was first offered as a formal course to meet the rising need and requests from the community for educational entomological outreach programs.

Service-Learning to Improve STEM Undergraduate Education

There is a general consensus that our national future is dependent upon undergraduate education in science, technology, engineering and mathematics (STEM). The importance of having a knowledge base of the current status of the STEM fields in higher education is essential. For many of our future leaders who will have to make crucial decisions that involve

science, math, engineering and technology, the undergraduate years are their final chance for academic study in these disciplines.

The National Academy of Sciences was granted a charter by Congress in 1863 to advise the federal government on scientific and technical matters. The Academy is a private, nonprofit society of renowned scholars engaged in scientific and engineering research who are dedicated to the future of science, technology, and their relevance to general welfare. The National Research Council was organized by the National Academy of Sciences in 1916 as their principal operating agency. The Council's mission was to associate the broad community of science and technology with the Academy's purposes of fostering knowledge and advising the federal government. The National Science Foundation (NSF) was created by Congress in 1950 as an independent federal agency with a primary mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..." Nearly 20 percent of all federally supported basic research initiatives carried out by colleges and universities in America are funded by NSF. The Center for Science, Mathematics, and Engineering Education was established in 1995 to provide coordination of all the National Research Council's education activities and reform efforts for all students at all levels, specifically K-12, undergraduate, school-to-work programs, and continuing education.

The needs of K-12 science education are strongly linked to undergraduate education. Not only does a sound precollege program depend on a flow of well-trained science teachers; sound curricula in the college years cannot be developed unless students are given a solid elementary and secondary science background on which to build. An especially controversial area, already referred to in connection with the balance between research and teaching involves the possible

use of institutions and mechanisms primarily associated with the research venture in the interest of improving science education.

Due to the critical nature of undergraduate education in the STEM areas, A Year of National Dialogue was inaugurated by a national convocation held at the National Academy of Sciences in Washington, D.C. on April 9-11, 1995. The Convocation was co-sponsored by the National Research Council and the National Science Foundation, and brought together representatives of all the key participants of higher education for the first time with the support of the nation's most prestigious scientific, engineering, and medical schools.

The principal conclusions from the convocation were that colleges and universities have been presented with a unique opportunity to remake undergraduate education in STEM. The reassessment of national goals, country-wide demographic changes, financial constraints affecting many institutions, and the rapidly growing influence of new technologies have all contributed to fundamental principles being reexamined. This reexamination will undoubtedly change higher education.

“The overall picture emerging from the convocation is one of striking contrasts. Twentieth-century science, mathematics, and engineering have become major forces of human progress and social change. They have not only created the technologies on which modern life is based; they have forged an entirely new view of the world, one based on close observation and creative insight. Yet undergraduate education in these subjects – where one would expect to find large and enthusiastic communities of students and faculty – often is hampered by outmoded instructional techniques, discipline fragmentation, and curricular inertia” (Analysis to Action 1996).

In 1996 the National Academy of Sciences reported on Undergraduate Education in Science, Mathematics, Engineering and Technology (STEM) and described current strengths and weaknesses. Strengths include: diversity of institutions and courses of study; students graduate with valuable skills; and undergraduate education produces highly motivated and capable

students who will go on to graduate school and become scientists, engineers, and mathematicians. Weaknesses of undergraduate education according to the report include: undergraduates do not receive enough education in STEM subjects; many classes rely on textbooks heavy on “coverage” but weak on example; drop-out rates from science major programs are high; there are disconnects between faculty members who teach in STEM and their research; not graduating adequate numbers of future science teachers; and graduates often lack vital knowledge and skills they need in the workplace (Analysis to Action 1996) .

The Business-Higher Education Forum (2003) in *Building a Nation of Learners* addressed the need for changes in teaching and learning. Increasingly, the education and business communities have become concerned about America’s global economic challenges. According to the 2003 report a nation of learners is one that effectively and efficiently helps students achieve proficiency in the basic, lifelong learning skills and also provides ongoing education and training tailored to both individual needs and workplace demands. Educators are supporting changes to higher education that are more responsive to the individual learner and more effective in achieving the desired educational outcomes. To increase the effectiveness of learning, educators must provide more engaging, relevant content targeted to individual styles of learning and needs.

The Business Higher Education Forum also examined America’s competitiveness in a 2006 initiative which described several quick facts regarding academic readiness and teacher shortages.

Academic Readiness: Quick Facts

Fact 1

Too few students take a rigorous college preparatory curriculum and consequently are academically unprepared for college or work.

Fact 2

Students with a rigorous foundation in STEM disciplines are more likely to enroll in and pass AP tests, attend college, and successfully graduate.

Fact 3

Few states require students to take a curriculum grounded in rigorous math and science beginning in middle school.

Teacher Shortage: Quick Facts

Fact 1

The United States faces a shortage of 283,000 secondary math and science teachers by 2015.

Fact 2

The ACI addresses the math and science teacher shortage by recruiting 30,000 adjunct teachers.

Fact 3

Promising responses to the teacher shortage involve collaboration among business, secondary and postsecondary education, and government.

The academic readiness quick facts infer the importance of rigorous curriculum in high school and a STEM discipline background beginning in middle school in order to adequately prepare students to attend and complete college. The teacher shortage quick facts paint a very dire picture of teacher shortages in the next ten years. Addressing this dilemma, however, will hopefully be collaboratively and creatively addressed by developing partnerships between academia, industry and government. According to Chickering and Gamson (1987) seven principles for the improvement of undergraduate education point toward service-learning:

1. Encourages student-faculty contact.
2. Encourages cooperation among students.
3. Encourages active learning.
4. Gives prompt feedback.
5. Emphasizes time on task.
6. Communicates high expectations.
7. Respects diverse talents and ways of learning.

Although there have been numerous publications about service-learning assessments in general, there has been limited research in the sciences. The science research that exists is

primarily from the health sciences (nursing, physical therapy, etc.), biotechnology, engineering, biochemistry, geology, natural resources, wildlife and science education (Scott et al 2007; Benore-Parsons 2006; Slivovsky et al. 2004; Millenbah and Millsbaugh 2003; Montgomery 2004; Straka 2005; Kurdziel and Libarkin 2002; Ropers-Huilman et al. 2005; Galantino et al. 2006; Dukhan et al. 2008; Hark 2008). More in-depth studies in the natural, life and applied sciences are needed on the effectiveness of service-learning as a pedagogical method.

Service-learning and inquiry science instruction are two types of experiential education. Inquiry science instruction in existing research has been the subject of much debate. At the center of the dispute is what constitutes inquiry science instruction. Minner et al. (2004) noted that “though descriptions of inquiry science instruction often share some common characteristics, there is no consensus about what it is or, more importantly, what it should be”. A synthesis of the current impact of inquiry science instruction on student outcomes was conducted by the Center for Science Education (CSE) at Education Development Center, Inc. (EDC), with funding from the NSF. The authors identified three areas which provide a framework for understanding inquiry science instruction and the impact on student outcomes that future research should address: 1) Type of Student Engagement, 2) Presence of Science Content, and 3) Elements of the Inquiry Domain present in the Components of Instruction.

Furco and Billig (2002) describe mechanisms for establishing norms for scientific inquiry in service-learning. Due to the nature of multiple different disciplines utilizing service-learning for research, it has become necessary to establish a set of norms for service-learning research. The national Research Council’s principles for scientific inquiry provide a foundation for guiding scientific research in all disciplines. Furco and Billig (2002) suggest that by applying these principles to the study of service-learning, the quality of service-learning research can be

improved and norms for service-learning research can be established. The National Research Council (2002) identified six core principles for research:

1. Pose significant questions that can be investigated empirically
2. Link research to relevant theory
3. Use methods that permit direct investigation of the question
4. Provide coherent, explicit chain of reasoning
5. Replicate and generalize across studies
6. Disclose research to encourage professional scrutiny and critique

It is important for science disciplines to have an understanding of how they are specifically engaging the K-12 educational community through professional development of science teachers as well as outreach activities targeted at the k-12 student community, as well as to assess the effectiveness of such programs. Scott et al. (2007) discussed how participants in a science service-learning course reported that “views about their own learning changed significantly during the service-learning program, such that they became more conceptual in their approaches to learning content and began to take responsibility for their own knowledge construction”. Kurdziel and Libarkin (2002) examined research methodologies in Geoscience as related to K-12 outreach activities. They specifically were looking at five questions including: 1) What characteristics are indicators of quality research for undergraduates or science teachers? 2) What can be done to improve laboratory research experiences for undergraduates? 3) What strategies are effective for professional development of science teachers? 4) How are projects evaluated? 5) What are some of the outreach activities that scientists use to engage the K-12 educational community and how is the usefulness of such activities evaluated? These questions are central to not only the effectiveness of geosciences but are relevant and critical to all science disciplines engaging science teachers and the K-12 student community.

Benore-Parsons (2006) examined how biochemistry students learn about cultural diversity issues. It was noted that “Biology, biochemistry, and other science students are well

trained in science and familiar with how to conduct and evaluate scientific experiments, however, they are less aware of cultural issues or how these will impact their careers in research, education, or as professional health care workers”. This same theme can be observed throughout the academy with an emphasis shift to not only training scientists, but preparing students to be active and engaged members of their communities and was also noted by Hark (2008).

According to Hark (2008), “the importance of engaging students in science and helping them to become informed citizens has been highlighted by many groups invested in science education”.

Hark (2008) wanted to engage biotechnology students with secondary school students by furthering both academic and civic goals through the integration of a service learning component into an undergraduate course. Montgomery (2004) also examined teaching in biotechnology using service-learning. In this program Montgomery required students to complete a service-learning project related to biotechnology that addressed the educational or programmatic initiatives of a local non-profit organization. Based upon comparative analysis of pre- and post-course surveys, he found that students’ knowledge of biotechnological methods and practical applications of biotechnology increased significantly. Students also reported a “greater understanding of the societal implications of the global utilization of biotechnology” (2004).

Millengah and Millspaugh (2003) utilized experiential learning in wildlife courses to improve retention, problem solving, and decision-making. The authors described experiential learning as “broadening, extending, and deepening the intellectual content of instruction by integrating theory and practice, increasing student motivation through the experience of applying knowledge, and encouraging students to develop their skills as independent scholars”. There is a growing awareness in the wildlife profession that students must retain basic theory, and application of concepts while being capable of assimilating and critically processing information.

The authors wanted to examine the role of experiential learning in helping students acquire these necessary skills and the mechanics of experiential learning. Straka (2005) noted that “service learning provides an opportunity to expose forestry students to a variety of landowners with diverse motivations, objectives, and forest conditions. This interaction tends to increase community involvement in forest resource planning, and landowners seek to become involved with the service learning”. The authors found that students involved with service learning led to increased student satisfaction and enhanced awareness of forest resource planning in the community.

Service-learning has been widely embraced in the engineering science community. Ropers-Huilman et al. (2005) examined a first-year biological engineering design course that incorporated a service-learning project. Results showed that “the service-learning project was a useful teaching method for accomplishing the learning objectives set forth by the instructor and by the Accreditation Board of Engineering and Technology”. It was also noted in this research that women and non-white participants assessed their learning outcomes to be greater than white males, which could have important implications in the recruitment and retention of such students in engineering. Dukan et al. (2008) also researched the implementation of service-learning in engineering and its impact on students' attitudes and identity. Analysis of the responses showed that students' became more aware and sensitive to their roles as engineers in a societal context as a result of the service-learning project.

Service-learning as a pedagogy to improve STEM undergraduate education has been researched in many science disciplines. Incorporating service-learning into science courses has demonstrated positive effects not only on student learning, but on cultural diversity, civic engagement, recruitment, retention and global awareness. Due to these findings it is apparent

that science students can learn course specific objectives while also being exposed to societal issues and their future roles while experiencing it first-hand. Equipping science students with civic skills will enable and encourage them to be engaged as active citizens in various aspects of their communities after graduation.

Assessment and Evaluation

Assessment in higher education is becoming increasingly more predominant not only at the institutional level, but at the college, department and course level as legislative and public concerns for quality teaching and learning become more prevalent. Assessment has two purposes: educational improvement, from the educators' perspective, within the academic institution; and accountability, from the perspective of the political community, employers, and the general public. Postsecondary assessment, unlike many other types of assessment, must be rooted in the course and in the classroom where learning actually occurs.

Assessment is a necessary tool to determine the effectiveness of the Department of Entomology's work in service-learning. Faculty members utilize it to continually improve instruction. University administrators need it to justify the use of institutional resources for service learning. Students use it to judge how they are performing in courses. Finally, community service agencies require assessment to provide them a clear picture of themselves as partners with students, faculty members and universities. Effective program evaluation provides useful feedback throughout the life of the program to planners, participants, instructors, organizations, sponsors, community groups, and other stakeholders (Caffarella 2002).

In higher education, assessment may occur before, during or after a student's college experience. Assessment is judged to be most beneficial when it leads to improvement of educational programs and student learning. Walvoord (2004) describes assessment of student

learning as “the systematic collection of information about student learning, using the time, knowledge, expertise, and resources available to make informed decisions about how to improve learning”. Astin (1993) calls assessment a “technology” for enhancing the feedback on the impact of educational policies and practices. According to Gaff et al. (1997), “assessment is the process of defining, selecting, designing, collecting, analyzing, interpreting, and using information to increase students’ learning and development”. Lenning (1980) described measurement as the process of gathering and quantifying information, the basis for assessment and evaluation. Assessment occurs when measurements are analyzed. Evaluation occurs when judgments are applied to assessment efforts (Astin 1993).

Weiss (1998) describes various evaluation methods for studying programs and policies. There are basically two types of evaluation, formative (ongoing) and summative (final). For the purpose of this research project a summative evaluation will be utilized. A more detailed definition of a summative evaluation is “a study conducted at the end of a program (or of a phase of the program) to determine the extent to which anticipated outcomes were produced. Summative evaluation is intended to provide information about the worth of the program” (Weiss 1998).

Assessment to improve teaching and learning is related to testing students and assigning grades for their performance, but it is also much more. When faculty test and assign grades, they are looking for what students have learned. Tests and grades are primarily summative for this reason. Assessment looks for achievement but also examines the learning process; it is both summative and formative. Second, in testing and assigning grades, the focus is on judging the student’s work; in assessment, faculty members turn the focus on themselves and students to ask

how curriculum and instruction can become more effective, and to search for information that will lead to improvement (Gaff et al. 1997).

Four recent trends in campus assessments have emerged according to Gaff et al. (1997). One trend reflects performance-based assessments in settings resembling what students will do in their civic, professional, and personal lives. The second trend in the assessment movement is increasing reliance on qualitative and quantitative assessment tools. Judgments about the quality of an individual's performance are more often being made with a wide array of material, not only on test scores or other numeric data. The evidence is evaluated for strengths and weaknesses in terms of skill levels and qualities such as "creativity, risk taking, persistence, meticulousness, ethical or social consciousness, empathy, and cultural sensitivity". The third trend of assessment in higher education has been greater use of local approaches that respect the particular emphases of curricula, the strengths and interests of faculty and the individual missions of stakeholders of particular colleges. The fourth trend is the emergence of embedded approaches or assessments that use student work samples and performances generated through regular coursework to not only assign grades, but also to see what they reveal about the effectiveness of the teaching-learning process (Gaff et al. 1997).

Assessment through Reflection

An essential component of service-learning is reflection. A definition of reflection developed by the Campus Outreach Opportunity League describes reflection as "a crucial component of the community service-learning experience and should place the service-learning experience into a broader context". Reflection pre, during and post service-learning is critical in order for students to discuss their reactions, share stories, and feelings about the experience. There are numerous activities available to be used to facilitate student reflection pre, during and

post service-learning project: journals (individual, structured, team, critical incidents), portfolios, papers, discussions, presentations, or interviews (Appendix B).

Pre service-learning program development is the most crucial time for service-learning. Pre service reflection activities may include: pre service questionnaire, imagining, critically reflective journal, and building an evaluation process to include all participants. Other activities may include: inviting community members to speak to the group, inviting experts, student alumni or practitioners, setting up a one day group building service project, or literature searches (Appendix C). Each of these activities used at UGA is an example of pre service-learning reflection (Appendix D).

There are various reflection activities faculty and staff can utilize during the service-learning project. Individual participant journals, structured journals, team journals, critical incident journals, portfolios, papers, class discussions and oral reflections on previous project activities, presentations and interviews are all examples of reflection activities during the service-learning project.

According to Ash and Clayton (2004) cognitive dissonance is a common emotion participants may experience. Students should be prepared for the service-learning experience from the orientation where many of their assumptions were challenged thus causing dissonance. Participants were made aware of potential cultural, gender, or residential differences they may experience during the project. Even with orientation, many students may experience this dissonance, confusion, uneasiness or disconnect with the other participants or the community with which they are working. Examples of during service-learning reflection may involve: community exploration, research activities, check-in/check-out, one good thing/one bad thing,

informal spontaneous discussion, interaction with the group, facilitator and the local community, or community presentations and dialogues (Appendix E).

Post service-learning reflection, an essential component of service-learning, may include: a covenant and action plan, critical reflection paper or a post-service questionnaire. The particular post service-learning activity selected is likely to be the participants' final activity for the project. Faculty and staff should emphasize the importance of thoughtful reflections so the participants understand not only their personal growth but also the importance of their contribution to the sustainability of the project.

Evaluation measures the impact of the students' learning experience and the effectiveness of the service in the community and gives direction for improvement, growth, and change. Students should evaluate their learning experience, and agencies should evaluate the effectiveness of the students' services. The first step in a service-learning initiative is to gather a needs assessment. Once evaluation data collection instruments are developed, an evaluation design can be prepared and implemented. Throughout the course/project's life, constant progress evaluations and interim reports should be established to aid in controlling extraneous variables and unforeseen situations that might arise. When the program reaches conclusion, an outcome evaluation should be administered to derive what, if any, lessons were learned or changes that occurred. The last step of the evaluation process should be to reassess needs based on all project result outcomes.

Athens-Clarke County Community Needs: Persistent Poverty and Drop Out Rates

According to data presented by Partners for a Prosperous Athens, a community-wide initiative designed to address the issue of persistent poverty in the county, children and youth of

Athens-Clarke County are most affected by the county's extremely high poverty rate as demonstrated by the following factors:

- One in four children in Clarke County lives in poverty.
- 33% of Athens-Clarke County high school students did not graduate on time in 2006.
- Athens' poverty rate is 5th in the nation for counties with populations of 100,000 or more.
- Only 28.6% of African American males who enter ninth grade graduate on time four years later (Prosperous Athens 2008).

Children in poverty are likely to have a mother who has not completed high school and who is a single parent. These children are less likely to be read to daily, an indicator of school readiness and overall success in school. Once in school, students need the resources and support of the entire community to achieve academically, graduate with a high school diploma, and have career goals or plans for post-secondary education (Carl Vinson Institute of Government 2008).

Students who drop out of high school are most likely to be unemployed and paid less over their lifetime than those students who graduate from high school, and those who went on to complete college (Isley and Hill 2003). The UGA Carl Vinson Institute of Government report on "Dismantling Persistent Poverty in the Southeastern United States" lists education as a top priority in pulling individuals out of poverty as well as ending poverty in the community.

Year 2001-02 enrollment by ethnicity in the Clarke County schools is: African-American, 57%; White, 27%; Hispanic, 11%; Asian, 3%, and Other, 4% (Georgia Department of Education 2008). Students eligible under federal guidelines to receive free and reduced priced meals in 2001 rose to 61%, up from 56% just one year before, indicative of the increase in poverty in Clarke County Schools. The ability to think, understand what is read, and communicate clearly are indicators of succeeding in the workplace. Higher test scores are connected to earning higher wages and being employed more often. Clarke County School's 2005 Adequate Yearly Progress

Report lists a 60% high school graduation rate. Disaggregating the data, only 50% of African American students and 42% of Hispanic students graduated in 2005. That means 40% of all students starting in 9th grade did not receive a high school diploma four years later. These students have dropped out of school and have now, most likely, become unemployed or will likely be paid less over their lifetime than those students who graduated from high school and those who went on to complete college (Isley and Hill 2003). The same Carl Vinson Institute report lists education as a top priority in pulling individuals out of poverty as well as ending poverty in the community.

A recent study by Scales & Roehlkepartain (2005) provides substantial empirical evidence that service-learning can have a dramatic impact on reducing the achievement gap particularly in distressed communities. As part of the Growing to Greatness Initiative, Scales & Roehlkepartain (2005) distributed a survey to over 5000 students (grades 6-12) and found that participation in service-learning has a positive correlation with increasing achievement in low-income schools and with low income students. Their study provides important data suggesting that participation in service-learning increases high school students' performance and learning in achievement motivation, homework, school engagement, bonding in school, reading for pleasure, school attendance, and earning higher grades compared to students who were not involved in service-learning.

Classic City High School: A Performance Learning Center

To stem the flow of students dropping out of the Clarke County School System and to recover those who already have dropped out, the Classic City High School Performance Learning Center was created in 2003. Classic City High is a non-traditional, voluntary high school. It is a partnership between the Clarke County School District, Communities in Schools,

and the Bill and Melinda Gates Foundation. The mission of the high school is “to provide a relative and rigorous curriculum, supported by positive, interactive relationships that ensure students achieve their full academic and social potential”. The curriculum is predominantly an electronic system, NovaNet, with elective courses for students such as Entomology. The school hours are Monday to Thursday, 10am – 5pm.

Classic City is uniquely designed to provide opportunities for high school completion in a non-traditional, adult school setting. Students are admitted to Classic City based on a rigorous admissions process. There were approximately ninety-eight students enrolled Fall 2005. Spring 2005 ethnic data show 58% African American, 32% White, 7% Asian, and 6% Hispanic students at the high school, roughly similar to the larger Clarke County Schools population. The high school student population includes a large number of older students: forty-nine dropouts were recovered in 2005. Ninety-four students transferred to the high school. Students need permission from their counselors to transfer to the high school if they are enrolled at another district high school.

Students who enroll in the high school have dropped out of school, or are behind in credits, or find the traditional school setting difficult. Over the past three years, the ethnic data is similar to that of the larger Clarke County School’s population; 62% African American, 29% White, 7% Hispanic, and 1% Asian. The high school graduation rate was 66% in Spring 2005, a significant improvement over the Clarke County high school completion rate, especially in view of the fact that the student population is non-traditional. In Spring 2008 the graduation rate was 70%. These high school students have received a “second chance” for a better quality of life and a better future for their children.

Classic City High utilizes a variety of approaches and best practices: individual development plans, small student/teacher ratios, different learning paces, service-learning and community service, connection to community support, mentoring, tutoring, respect, flexible scheduling, delayed start of school day, small school, team approach, guest speakers, weekly motivational assemblies, and teachers as learning facilitators with an on-line curriculum and project based learning. As the mission states, relevancy, relationships and rigor are intrinsic to the school's operations.

In the school year 2005-06, students enrolled at the high school had an average twenty-two point improvement in core subject marks. Ninety eight percent of the students stated that they would recommend the school to others. Despite the high school's tremendous success, there are significant needs in the area of science and math instruction, and lack of access to the arts in the curriculum.

In 2005 an interdisciplinary service-learning partnership was developed between the high school and a group of University of Georgia faculty, staff and students interested and engaged in service-learning. The primary goal of the partnership was to cultivate dialogue and projects between the high school and UGA. University students, faculty and staff worked with teachers and students from the high school in similar areas towards pre-determined objectives focused on various interdisciplinary service-learning projects.

International Service-Learning

Service-learning is a teaching and learning strategy that integrates meaningful community service with instructional planning and reflection to enhance the learning experience, teach civic responsibility, and strengthen communities. Service-learning in an international context has been the topic of numerous publications across disciplines. Annette (2002) examined the extent

to which higher education institutions contribute to the development of a global civil society and assist local communities in having a democratic voice in the process of globalization. The researcher specifically wanted to know “to what extent do institutions provide their students the opportunities to develop the key skills and capabilities needed to understand the process of globalization that is shaping their lives so quickly and enable them to develop as global citizens?” This is an intriguing question and with the rapid increase in student interest in international programs, and more specifically service-learning programs, it is essential to better understand how international service learning can equip students in global citizenship.

Internationalizing university curricula is a powerful and practical way of bridging the gap between rhetoric and practice (Leask 2001). Many instructional strategies have surfaced to address the diverse needs of the learner. With this has come a desire to make education an ever-changing, relevant, lifelong experience that fosters experiential education, linking the student with community (Cantor 1995). When using experiential learning to design an educational environment, Cantor states, “it is not uncommon to read reports of students working in community based organizations and clinics in forms of service-learning”.

Fowler and Blohm (2007) discuss experiential learning in intercultural training as an opportunity to improve the odds for a successful experience with a different culture. The authors discussed several factors that carry cultural implications including:

1. Concepts (leadership, fairness, power, success, rules, rewards, winning, confidentiality, punishment, decision making)
2. Knowledge (one culture’s historical concepts, heroes, anecdotes, proverbs; one’s culture’s daily “tools” (\$, transportation, housing), rituals)
3. Value systems (respect, competition, cooperation, time, group, individuals, status, absolute versus relative values or right versus wrong)
4. Language and communication styles (first and second languages, symbols, non-verbals, acceptable terminology, linear versus circular, direct versus indirect, high versus low)

5. Cultural Advantage (rules of game may favor one culture's problem-solving style, goal or mission of the game may exclude a particular group)

Knowledge of international and cross-disciplinary perspectives is a foundation for successful study abroad programs (Gelmon and Billig 2007). Westrick (2004) also discussed the influence of service-learning on intercultural sensitivity of international school students in Hong Kong using the Intercultural Development Inventory (IDI).

Steinberg (2002) explained that “experiential education is a laudable and creditworthy endeavor in study abroad and discussed some approaches designed to reinforce the academic side of experiential study” in *Involve Me and I Will Understand: Academic Quality in Experiential Programs Abroad*. Learning through involvement is a general theme that most study abroad participants experienced while participating in an international course.

A topic that does not receive adequate instruction time in any discipline is grant writing. Griffith et al. (2006) discussed how a “grant writing experience can be a valuable asset for students completing masters-level degree programs across a variety of disciplines with service-learning”. Combining grant writing and service-learning can be beneficial to self-funded programs, programs working with nonprofit organizations, schools, or various community groups who benefit from the extramural funds.

Increased interest and emphasis is being placed on study abroad experiences for students at colleges and universities in the U.S. The number of American undergraduates who study abroad has increased significantly in the last decade (Carlson et al. 1990) as students tend to think that international experiences will offer them a competitive edge in the increasingly competitive job market. In the last decade, calls for internationalization of higher education curricula have increasingly turned universities' attention to study abroad programs (Pickert 1992).

Service learning can be broken up into three main parts: the educational experience for the students, the educational experience for the community, and a period of reflection made by the student on the service experience (Kaye 2004). Service based learning is a rapidly growing mode of active teaching in higher education institutions that has been shown to have numerous positive outcomes for students (Brady et al. 2005). “Service-learning is a teaching method which combines community service with academic instruction as it focuses on critical, reflective thinking and civic responsibility. Service-learning programs involve students in organized community service that address local needs, while developing their academic skills, sense of civic responsibility, and commitment to the community” (Campus Compact National Center for Community Colleges 2008).

According to Ash & Clayton (2004), dissonance is a common emotion participants may experience. Even with orientation, many students may experience dissonance, confusion, uneasiness or disconnect with the other participants or their community group. Examples of “during” service-learning reflection may involve: community exploration, research activities, check-in/check-out, one good thing one bad thing, informal spontaneous discussion, interaction with group, facilitator and the local community, or community presentations and dialogues.

The relationships built in service-learning cross socially-constructed boundaries of ethnic, educational, linguistic and socioeconomic levels. Service-learning explores the intersection of community service, scholarship, and teaching-and-learning. Essential and vital tools for service-learning are the relationships developed with community partners. This collaboration is critical to the success of any service-learning class. Mutual interests and common goals shared by faculty and community partners are more likely to be obtained by understanding the needs and perspectives of the community-based partnerships (Peacock, Bradley, and Shenk 2001). In

collaborations throughout the course, communication issues and barriers that may arise due to misunderstandings can be addressed at the forefront. This mutual relationship increases satisfaction for all partners and creates a stronger community-based placement for students and faculty.

Knowledge of a community's social structure and characteristics are crucial for an effective relationship. Pre-orientation is an essential factor to develop and ensure a conducive working relationship between the many participating parties, such as student – educator, student – student, educator – agency, student – agency. Principles of group dynamics can be applied while maintaining efficient communicative relationships, which aides in team building. Creating a liaison or point person between the involved parties assists individual and class adjustments, and recognizes processes involved in community change. “Unpacking the knapsack” of service-learning assumptions at the end of the project is not only a good tool for evaluation but also allows observation of the changes in social assumptions. Maintaining sustainability and open relationships with developed partnerships secures future working relationships, and creates possible opportunities for employment within the contracting agencies or other service-learning projects to occur.

Importance of Civic Engagement in Higher Education

Service-learning is an experiential pedagogy and shares four common characteristics of being mutually beneficial and reciprocal, addressing a community identified need, sustainability, and being linked directly or indirectly with course curriculum to connect theory and practice. The short-term effects for students involved in service-learning may be an ownership of their learning since students are actively engaged in the learning process. Students are not lectured ‘at’, but are asked to solve complex real world problems by addressing, facing, and overcoming

everyday barriers and obstacles. A long-term benefit for students may be a greater awareness for addressing community needs by being an active citizen and an engaged community member in the future. Service-learning represents an important mechanism in higher education that challenges students to see connections between their learning and a larger society. Supporters argue that, in addition to being a good way to strengthen student learning of academic material, service-learning participation might strengthen students' commitment to addressing civic and social concerns (Corporation for National and Community Service 2008).

Service-learning research can be strengthened by better defining and measuring service-learning components such as intensity, duration, and degree of reflection should be clearly specified and measured and included when findings are reported (Billig and Furco 2002a; Eyler 2002). However, more empirical evidence connecting science service learning with civic engagement is needed, particularly in the life sciences. A need for multi-site studies; increased use of reliable and valid psychometric measures, and triangulation of data, rather than reliance on self-report measures, have also been identified as needs in reviews of service-learning research studies (Billig and Eyler 2003; Billig and Furco 2002b; Eyler 2002; Furco 2003). Ehrlich (1997) in Eyler and Giles (1999) stated that "citizenship is often cited as the purpose of education in general and service-learning in particular, and the focus on citizenship as an outcome is closely tied to the process of social problem solving".

Astin (2005) proposed three outcomes or dimensions of student learning:

- Cognitive Behavioral (Study Habits, Class Attendance)
- Cognitive Psychological (GPA, Critical Thinking)
- Affective Behavioral (Leadership skills, Civic Action involvement)

Citizenship, like personal development, is considered to be an affective or behavioral goal versus a cognitive goal of higher education. It seems that effective citizenship relies on learning which

has been a focus of empirical studies on understanding the cognitive dimensions of citizenship. Students are unlikely to be effective community participants unless they understand complex social issues and are able to critically analyze them.

Effects of service-learning on civic outcomes in various disciplines are found in the literature. Vogelgesang and Astin (2005) revealed that engagement with the community declines during the years following college. Compared to when they first entered college, alumni also show less interest in community issues and helping others. This research report examined specific forms of civic engagement among college alumni, explored gender differences in post-college activities and beliefs, and described differences among different types of higher education institutions.

Wegner (2007) discussed civic engagement through partnerships for public purposes by engaging higher education in societal challenges in the 21st century. The author concluded that higher education has two fundamental responsibilities. First, to provide graduates and the nation the skills needed to be effective in a global, increasingly competitive economy. Second, to close the achievement gap between advantaged students—educationally, culturally, and economically—and disadvantaged students.

Pritzker and McBride (2005) examined service-learning and civic outcomes. The authors state that “service-learning has been identified as an intervention that may address low levels of youth civic engagement”. Service-learning is compared to two other interventions that have been associated with civic outcomes; community service and civic education curricula. Studies of these three types of interventions were reviewed and compared. Across a range of civic indicators, no clear pattern was found regarding the impact of each intervention. This review

emphasized the necessity for greater rigor and sensitivity of measurement in future research on civic development among school-age students.

Parker-Gwin and Mabry (1998) also discussed service learning as a pedagogy and civic education where two primary goals of service learning for students are positive civic and academic outcomes. Most research has focused on service learning's effectiveness as civic education. In this study, the authors examined both civic and academic outcomes for students participating in three models of service-learning courses. After one semester, student outcomes were mixed. Two pedagogical issues were emphasized; requiring student participation in service learning, and the role of reflection activities in positive outcomes.

Prentice (2007) in *Service Learning and Civic Engagement Academic Questions* examined how work outside of the classroom can complement what goes on in the classroom in mutually beneficial ways for the community and students. Statistical survey analysis suggested that participation in service-learning can increase students' civic engagement, when civic engagement is defined as more than just political action. Misa et al. (2005) emphasized the lasting impact of college on young adults. Their work explored how colleges and universities foster social responsibility by examining college experiences that encourage students' civic and political engagement. They concluded that colleges and universities can provide curricular and co-curricular opportunities for their students to become socially responsible citizens into the post-college years.

Denson et al. (2005) discussed whether service learning and a college climate of service leads to increased political engagement after college. The authors stated that "there is a growing national interest in strengthening the civic mission of higher education (Boyte and Hollander 1999; Erlich 1999)". Attention is now being given to examining the role of educational

institutions in their communities (Kellogg Commission 1999), and in preparing students to assume the responsibilities of citizenship in a democratic society (Astin 1997; Barber 2001; Kellogg Commission 1999; McDonnell, Timpane, and Benjamin 2000).

CHAPTER 3

RESEARCH METHODS AND DATA COLLECTION

This chapter examined the research methods and data collection techniques utilized in this dissertation. A triangulation mixed-methods design was used to evaluate entomological service-learning for 108 students, community members, K-12 teachers and students and entomology department administrators during 2006, 2007 and 2008. Quantitative and qualitative data were simultaneously collected and merged in order to better understand the problem. The rationale for this design is to use quantitative data to enhance the reliability of qualitative results, and to use qualitative techniques by examining multiple measures of attitudes and behaviors to refine quantitative outcomes by providing information about the setting (Creswell 2005).

Research Question 1 of this dissertation asks what the status is and distribution of service-learning in Entomology programs nationwide? In order to approximately accomplish this, departments and units throughout the United States responded to a nine question closed and open-ended electronic survey (Appendix A). Sixty-five surveys were distributed and thirteen surveys were returned for a response rate of 20% (Table 1)

Research Question 2 asks how domestic and international service-learning courses are developed and implemented in the entomology curriculum at UGA? Spring 2006, six undergraduate students and two high school students from our community partner school, Classic City High School, enrolled in Entomology Outreach and Service-Learning. Spring 2007, fifteen undergraduate students and one Classic City High School students registered. Spring 2008, fourteen undergraduate students enrolled in Entomology Outreach and Service-Learning.

Total participation in this three year research study consisted of thirty-eight students. There were twenty-five males and thirteen females.

Table 1: Entomology Outreach and Service-Learning Participants
N=38

Year	Undergraduate	High School	Total	Male	Female	Total
2006	6	2	8	5	3	8
2007	15	1	16	9	7	16
2008	14	0	14	11	3	14
Total	35	3	38	25	13	38

All thirty-eight students agreed to be participants and indicated this agreement by signing a consent form (Appendix F) the first week of class. This form requested permission for using their weekly journal entries and written assignments as data and several during class reflection activities. Students were then asked to complete a pre service-learning survey (Appendix G). At the end of the course students were asked to complete an identical post service-learning-survey (Appendix G). Participation in the survey was voluntary and students' grades were not affected by their participation. Findings of this quantitative portion of the research study will be addressed in Chapter 6.

Students enrolled in *Entomology Outreach and Service-Learning* were required to submit thoughtful and reflective weekly writing assignments. An organizational calendar was included in the syllabus that outlined the weekly writing requirements (Appendix H). A detailed description of topics and suggested resources for the weekly writing assignments was also provided to the students (Appendix I). In the UGA entomology course, class time was spent discussing each of these topics weekly. Students would share their findings and writings with fellow class members and discussions would follow.

Insect Natural History in Costa Rica was the first study abroad program in the Entomology Department. I developed the syllabus in Spring 2006 (Appendix J) and all logistical arrangements were determined, students recruited, reservations were made for lodging, teaching, research and service-learning while abroad. As a field based course with a research and collecting component, Costa Rica collecting, research and export permits were required and I acquired them through the proper governmental offices in Costa Rica prior to our travel.

During the summer, 2006 six undergraduates and one high school student from our partner school, Classic City High School participated in *Insect Natural History in Costa Rica*. This high school student had taken the Classic City Entomology class in Fall, 2005, had participated in ENTO 3900 service-learning class at UGA in Spring, 2006, and was fully funded to participate in this international summer experience.

During summer 2007, five undergraduate students, one graduate student, one high school student and one high school entomology teacher, both from Classic City High participated in ENTO 3140-3140L. The high school student had taken the high school Entomology class in Fall, 2005, had participated in the ENTO 3900 service-learning class in Spring, 2006, had been the Teaching Assistant at the high school for the entomology class at UGA in Fall, 2006 and had ultimately worked up the courage to travel abroad by Summer 2007.

In the summer of 2008, ten undergraduates and one graduate student registered for the course. Four teacher interns participating in the Georgia Interns and Fellowships for Teachers (GIFT) program (two elementary school teachers and two high school teachers) also traveled to Costa Rica and participated in all aspects of the course.

Table 2: Insect Natural History in Costa Rica Participants
N=30

Year	Undergraduate	Graduate	HS Students	K-12 Teachers	Total	Male	Female	Total
2006	6	0	1	0	7	4	3	7
2007	5	1	1	1	8	6	2	8
2008	10	1	0	4	15	7	8	15
Total	21	2	2	5	30	17	13	30

Total participation in this three year research study was thirty students and teachers: twenty-one undergraduates, two graduates, two high school students and five K-12 teachers. There were seventeen males and thirteen females. All thirty students signed a consent form the first day of class (Appendix F). This form requested permission for us to use their journal entries and written assignments as data and several times during class reflection activities. Students were then asked to complete a pre service-learning survey (Appendix G). At the end of the course students were asked to complete an identical post service-learning survey (Appendix G). Participation in the survey was voluntary and student’s grades were not affected by their participation. Findings of this quantitative portion of the research study will be addressed in Chapter 6.

Research Question 3 asks what are learning outcomes associated with *Entomology Outreach and Service-Learning*? Learning outcomes associated with *Entomology Outreach and Service-Learning* were identified in the Final Reflective Summaries (Appendix K) required at the end of the course. Students were asked five questions regarding society, teaching and learning, science content, knowledge and self and impact.

Research Question 4 asks what impacts are associated with entomological outreach education for entomology graduate students, undergraduate students, and community partners? Total participation in for this research question was twenty-seven entomology undergraduate and graduate students and community members: fourteen undergraduates, six graduate students and seven community members. There were eleven males and sixteen females.

Table 3: Undergraduate, Graduate and Community Survey Participants

N=27

Survey	Male	Female	Total
Undergraduate	9	5	14
Graduate	2	4	6
Community	0	7	7
Total	11	16	27

The undergraduate and graduate outreach surveys were provided to all entomology undergraduate majors and entomology graduate students and consisted of fifteen open and closed ended questions (Appendix L and M). The community outreach survey consisted of thirteen open and closed ended questions. All community partners for the past two years were identified and invited to complete the survey (Appendix N).

Research Question 5 asks if participating in science service-learning (domestically and internationally) affect students' civic outcomes? In an empirical attempt to capture changes in civic attitudes and behavior over time the Ohio Campus Compact created a student service-learning (Appendix G). In this study, we have used this survey to measure how service-learning students self report changes in their own civic attitudes over time associated with their participation in service-learning courses. The questionnaire was designed to assess students'

civic outcomes and consisted of forty-two Likert-type items with responses ranging from one (strongly agree) to five (strongly disagree). A few other questions are on a six point scale.

Students enrolled in two entomology service-learning courses at UGA, ENTO 3900, *Entomology Outreach and Service-Learning* and ENTO 3140, *Insect Natural History in Costa Rica* and students enrolled in a college service-learning course AESC 4920/6920, *Project Focus* completed the Student Service-Learning Survey (Appendix G). Thirty-seven students, seventeen males and twenty females, completed the survey before and after they took the course. Attitude scales typically result in a total score indicating the direction and intensity of the individual's attitude toward a stimulus category. In the construction of an attitude scale, the different questions are designed to measure a single attitude or one-dimensional variable, and some objective procedures are usually followed in the effect to approach this goal. In all attitude scales, respondents indicate their agreement or disagreement with a series of statements about the object of the attitude.

The first five questions (Q1 – Q5) in the survey ask for name, age, grade and sex. The remaining thirty-two questions (Q6- Q42) are related to service-learning and are classified into six groups (constructs):

- Social Responsibility (SR; SS1)
Questions associated with SR construct = 6, 11, 16, 17, 22, 25, 26, 27
- Confidence / Relationships (CON; SS2)
Questions associated with CON construct = 7, 12, 14, 15, 18, 21, 23
- School Engagement (SE; SS3)
Questions associated with SE construct = 8, 28, 30, 31, 32, 35, 37
- Personal Empowerment (PE; SS4)
Questions associated with PE construct = 9, 10, 29
- Civic Engagement (CE; SS5)
Questions associated with CE construct = 13, 19, 20, 24, 33, 34, 36

- Future Civic Engagement (FUT; SS6)
Questions associated with FUT construct = 38, 39, 40, 41, 42

Social Responsibility Construct

- Q6 As a student, I believe that taking care of people who are having trouble taking care of themselves is everyone's responsibility.
- Q11 As a student, I believe that helping a person in need is something people should only do for friends or relatives.
- Q16 As a student, I am aware of the problems in my community and which organizations are working to address them.
- Q17 As a student, I believe that you should nearly always be paid for helping others.
- Q22 As a student, I believe that most problems will solve themselves if you just leave them alone.
- Q25 As a student, I believe that people with disabilities can hold jobs and contribute to society.
- Q26 As a student, I am concerned about the problems and needs of my fellow human beings.
- Q27 As a student, I believe it is up to the "experts" to solve problems in my community.

Confidence/Relationship Construct

- Q7 As a student, I enjoy being around people whose backgrounds and experiences are different from mine.
- Q12 As a student, I believe that there is not a whole lot to be learned from old people.
- Q14 As a student, I am a good team player.
- Q15 As a student, I know how to get things done.
- Q18 As a student, I usually treat other people with dignity and respect, regardless of who they are or where they come from.
- Q21 As a student, I want to help other people who have special needs because of their economic, racial, social, mental, or physical situation.
- Q23 As a student, I would have no problem working with a person whose race or ethnicity differs from mine.

School Engagement Construct

- Q8 As a student, I am usually motivated to take advantage of opportunities to learn more than the minimum required to pass the tests.
- Q28 As a student, I have a generally positive attitude about school.
- Q30 As a student, I have trouble linking learning in school to real life.
- Q31 During an average week, how many hours do you spend doing homework?
- Q32 During an average week, how many hours do you spend watching tv?

- Q35 During an average week, how many hours do you spend participating in extra-curricular school activities?
- Q37 During an average week how many hours do you spend working at a paid job?

Personal Empowerment Construct

- Q9 As a student, I often seek out challenging opportunities that test my skills and abilities.
- Q10 As a student, I have a sense of “usefulness” in relation to my community.
- Q29 As a student, I believe that I can change what might happen tomorrow by what I do today.

Civic Engagement Construct

- Q13 As I student, I believe that, on a project, it is everyone’s responsibility to make sure the work gets done.
- Q19 As a student, I believe that being actively involved in community issues is everyone's responsibility, including mine.
- Q20 As a student, I believe that young people like me can have a positive impact on schools and/or communities.
- Q24 As a student, I think that students should be required to perform service projects in the community in order to graduate.
- Q33 During an average week, how many hours do you spend doing volunteer work to help other people?
- Q34 During an average week, how many hours do you spend attending services at a religious institution?
- Q36 How many service or volunteer projects have you participated in without reflection?

Future Civic Engagement

- Q38 In the next 5 years, how likely is it that you will be actively involved in political issues/social causes affecting your community?
- Q39 In the next 5 years, how likely is it that you will volunteer your time to help others who are having problems or are in need?
- Q40 In the next 5 years, how likely is it that you will spend time working at preserving and protecting the environment?
- Q41 In the next 5 years, how likely is it that you will volunteer to tutor kids, visit the elderly, be a mentor, or coach a team?
- Q42 In the next 5 years, how likely is it that you will find personal and intellectual satisfaction in volunteering your time to help others?

CHAPTER 4

SERVICE-LEARNING IN ENTOMOLOGY

Service-Learning in Entomology Departments/Units

A review of the literature showed that there is little information available about service-learning in entomology. Research Question 1 of this dissertation asks what the status is and distribution of service-learning in Entomology programs nationwide? In order to approximately accomplish this, departments and units throughout the United States responded to a nine question closed and open-ended electronic survey (Appendix A). Sixty-five surveys were distributed and thirteen surveys were returned for a response rate of 20% (Table 4). In this survey, service-learning was defined as “a teaching method that combines instruction in a subject with a service project or activity for a community or organization that acknowledges the students’ contribution and that students learn while serving and grow through reflection on and recognition of their contributions”.

Of the respondents, thirteen of thirteen indicated that their institution currently offers courses involving service-learning or courses with a service-learning component. Next, I wanted to determine the level of institutionalization of service-learning on campuses nationwide within an existing entomology department or unit. 69.2% (9 of 13) of respondents indicated that their representative institution does have an Office of Service-Learning or a similar office coordinating service-learning programs or courses on campus. Formal offices for facilitating service-learning nationwide range from college academic affairs offices to Service-Learning Centers/Office, Outreach Offices, Curricular Engagement offices, and Learning and Teaching

Institutes. 30.8% (4 of 13) of respondents said that there is currently no formal office on their respective campuses coordinating service-learning.

I also wanted to get a sense of college/university interest in promoting or incorporating service-learning on campuses nationwide. 84.6% (11 of 13) of survey respondents responded positively that service-learning was being promoted by administrators at their respective institutions. 15.4% (2 of 13) responded that service-learning was not currently being promoted by administrators on their respective campuses.

I then wanted to see if there were funds available that faculty or staff could apply for to develop service-learning programs at their respective institutions in entomology departments or units. Funding opportunities are comparable to UGA's Office of Public Service & Outreach annual seed grants to promote Outreach and Service-Learning, (Scholarship of Engagement Grants), for both domestic and international service-learning projects. 76.9% (10 of 13) of survey respondents indicated that yes, funding opportunities are available. Funding sources included Office of the Vice President of Engagement, Service Learning Centers, Scholarship of Teaching Grants, Institute for Learning and Teaching, and Water resources education grants. 23% (3 of 13) responded that funding opportunities for service-learning are not available on their respective campuses.

The next question on the survey was directly related to individual entomology departments or unit's offerings of entomological service-learning courses or entomology courses with a service-learning component. 46.2% (6 of 13) of survey respondents indicated positively that their respective departments offered service-learning courses or courses with a service-learning component. Descriptions of courses included: Entomology Capstone Experience, Insects in the Environment, Insect Ecology, Conservation Biology, Naturalist Outreach, a non-

major entomology course, Physiology of Host-Pathogen Interactions, Outreach and Service-Learning and Insect Natural History in Costa Rica. 53.8% (7 of 13) of survey respondents indicated that there were no service-learning courses or courses with a service-learning component in entomology. Although every institution responding to the survey offers service-learning courses/service-learning components, only half of the entomology departments included in this survey offer service-learning courses.

With the emergence of study abroad programs nationwide, I also wanted to determine how many entomology departments offered study abroad service-learning courses or study abroad courses with a service-learning component. Only 15.4% (2 of 13) of survey respondents indicated that they offer international entomological service-learning experiences. 84.6% (11 of 13) of respondents indicated that they do not currently offer entomological international service-learning courses or study abroad entomology courses with a service-learning component.

Since UGA entomology has observed a close and natural integration with service-learning and the existing and historically successful entomology outreach programs, I wanted to know whether or not entomology departments around the U.S. have similar educational community outreach programs that could incorporate a service-learning component. 84.6% (11 of 13) of the survey respondents indicated positively that they currently have educational community outreach programs. These programs range from student clubs, to a staff position as outreach coordinator, collaborations with other agricultural departments, as a component of 4-H, Bug Bash, Power of Bugs, Insect Adventure, Insect Zoo and other non-formal outreach programs. 15.4% (2 of 13) of survey respondents indicated that their respective departments do not currently have an educational community outreach program.

Finally, in relation to the entomology departments or units with educational community outreach programs, I wanted to determine if students could receive course credit for participating in educational community outreach programs since integration into the curriculum is an important aspect of service-learning. 53.8 % (7 of 13) of survey respondents indicated that students can receive course credit for participating in community outreach programs. Examples of outreach programs or courses in which students could receive course credit include, General Entomology, Insect Appreciation, Undergraduate Orientation, NSF-funded science enrichment program in community schools, Extension Practicum, Naturalist Outreach, Special Projects or Topics, Group or Independent Study courses, Outreach and Service-Learning, and Insect Natural History in Costa Rica. 46.2 % (6 of 13) of respondents indicated that students in their respective departments cannot receive course credit for participating in entomology outreach programs.

Table 4: Entomology Departments/Units Service-Learning Survey

N = 13

Question	Yes	No	%
SL courses or courses with a SL component	13	0	100%
Formal office coordinating SL	9	4	69.2%
SL promoted by administration	11	2	84.6%
Institutional Funding Available	10	3	76.9%
Entomology SL courses/component offered	6	7	46.2%
International SL courses/component offered	2	11	15.4%
Entomology Outreach Program	11	2	84.6%
Course credit available for outreach participation	7	6	53.8%

Entomology Outreach and Service-Learning: Development and Implementation

Research Questions 2 asks how domestic and international service-learning courses are developed and implemented in the entomology curriculum at UGA? The development of the first entomology outreach and service-learning course in the Department of Entomology at UGA, *Entomology Outreach and Service-Learning*, will be discussed in this chapter. ENTO 3900 is a Special Topics course routinely offered in the department. I created a section of ENTO 3900, *Entomology Outreach and Service-Learning* which was offered first Spring 2006. The syllabus (Appendix J) describes the course as an overview of entomology outreach and service-learning. In preparing and developing the syllabus it was essential that reflection, as a critical component of service-learning, must be emphasized throughout the course in weekly written assignments, ongoing course reflection activities, and in the final reflective summary. Students participated in a guided study and practice in developing entomological educational programs for the public (mostly children) in the Athens/Atlanta area, which included identifying needs, establishing objectives, and designing and evaluating entomological educational programs.

Objectives of the course, as outlined in the syllabus (Appendix J), are to facilitate a partnership between the community and UGA. Students enrolled in this course spend significant time in local schools and community organizations hosting entomological programs. Goals of the course include:

- Improve the science experiences and science content knowledge of community students in the UGA area through hands-on science programs.
- Increase awareness among community students about career opportunities related to agricultural and environmental sciences.
- Provide experiences for students and teachers that will bring about more positive attitudes about science.
- Develop a sense of community involvement for UGA students that will continue after graduation.
- Promote science knowledge in a positive way to the community students and teachers who work with the UGA students.

- Enhance the communication and leadership skills of UGA students.

Students are required to participate in weekly reflection activities. Each class begins with a student report of the previous week's outreach activities. During these meetings, students discuss their experiences at community outreach programs they have facilitated. Students are also required to submit thoughtful and reflective weekly writing assignments or journal entries. Questions were assigned to guide the journal entries and the reflective summary. Each student is also required to participate in a service-learning project with our community partner Classic City High School. Students implemented specific projects with guidance from the instructors.

Reflection, participating in outreaches, and the service-learning project were all a part of the grade apportionment. The grade apportionment was amended Spring 2007 and Spring 2008 with the removal of a UGA Club Presentation. However, students were now required to coordinate an outreach on their own and find volunteers in the course or in the department to assist. More emphasis was placed on the summary reflection, outreach hours, and professionalism and participation with the removal of points for the service-learning project.

Spring 2006 Grade Apportionment

Reflective Journals	20pts
Summary Reflection	20pts
UGA Club Presentation	10pts
Outreach Hours	20pts
Service-Learning Project	20pts
Overall Professionalism and Participation	<u>10pts</u>
Total	100pts

Spring 2007 Grade Apportionment

Journals & Written Assignments	20pts
Summary Reflection	25pts
Coordinate Outreach Program	10pts
Outreach Hours	30pts
Overall Professionalism and Participation	<u>15pts</u>
Total	100pts

Spring 2008 Grade Apportionment

Journals & Written Assignments	20pts
Summary Reflection	25pts
Coordinate Outreach Program	10pts
Outreach Hours	30pts
Overall Professionalism and Participation	<u>15pts</u>
Total	100pts

Outreach activities ranged from visiting K-12 classrooms for an instructional outreach with twenty to 100 participants to large festivals with 500+ participants. Spring 2006 students in Entomology Outreach and Service-Learning participated in over thirty outreaches to nearly 3600 children and other community members. Spring 2007 students participated in approximately thirty outreaches with over 4000 total participants. Spring 2008 students organized and conducted over thirty outreaches reaching almost 3800 individuals. Outreaches have ranged from three and four year olds, to elementary, high school or college students, to science teachers, as well as to the elderly community.

Students were required to submit thoughtful and reflective weekly writing assignments. An organizational calendar was included in the syllabus that outlined the weekly writing requirements (Appendix H). A detailed description of topics and suggested resources for the weekly assignments were also provided to the students (Appendix I). Topics included describing their favorite and least favorite teachers, define service-learning, entomology myths and facts, grant writing, reviewing service-learning literature, critical thinking and suggestions for future projects. Class time was spent discussing each topic weekly. Students would share their findings and writings with fellow class members and discussions would follow. This proved to be a very effective way for students to reflect on their own opinions and personal biases while simultaneously engaging in the current literature and resources surrounding the topics.



Figure 1: Outreach at a Pre-K program



Figure 2: Highland Hills Assisted Living Outreach



Figure 3: Georgia Science Teachers Association Annual Conference Outreach



Figure 4: College of Agricultural and Environmental Sciences Fall Kickoff Outreach

Apiary Service-Learning Project

Through a collaborative proposal for a Scholarship of Engagement Grant (SEGUE) offered annually by the Office of the Vice President for Public Service and Outreach at UGA, I was awarded \$2000 to build an apiary at Classic City High. As a major component of the *Entomology Outreach and Service-Learning* course students were required to submit a proposal for a SEGUE Mini-Grant (an additional \$400) for apiary supplies (Appendix O). Students were given a handout titled “The Basic Structure of a Grant” (Appendix P) and asked to each write a proposal. Students evaluated each other’s proposals and collaboratively developed a single class apiary proposal to submit for funding from the SEGUE mini-grant program (Appendix Q).

Before the proposal was funded we needed permission from the Clarke County Board of Education, who shares the current building where the high school is located, to place the hives. The two high school students requested a meeting with the superintendent of Clarke County Schools to make a formal proposal for an apiary at the high school. The students prepared a presentation, presented maps of the campus and suggested sites for placement of the hives, information for how the school and the entomology classes at the high school would sustain the hives in the future, and ultimately for permission to place the hives on campus. The superintendent was positively responsive to the request and approved the apiary.

The jointly written class proposal was funded and the students had a total budget of \$2400 to build an apiary at the high school. Students were required to research supplies and equipment necessary for building and sustaining an apiary and to include these costs in the budget. Once the grant was received students were ready to purchase all of the equipment and materials to build the frames and the supplies necessary to work the hives. Equipment included purchased hive bodies and supers, frames, foundation, frames, beekeeping tools, smokers, and

protecting clothing. Students spent many of their required outreach hours, at the UGA Bee Lab constructing the hives, which included nailing the hundreds of frames together and weatherproofing and painting the supers.



Figure 5: Building the frames for the beehives Spring 2006



Figure 6: Painting and weather proofing the supers for the beehives Spring 2006

In May 2006, three bee colonies were placed at the high school. Each of the three colonies had drones and a queen. Students at the high school as well as undergraduates enrolled in *Outreach and Service-Learning* met at the high school to place the bee colonies. Both undergraduates and high school students worked together to light the smokers to calm the bees. Also, the students worked together to move the live colonies that had been transported from the UGA Bee Lab in Watkinsville, GA to the high school. The bee colonies were set up in an open, well lit area on the back grounds of the school. The school is enclosed by a chain link fence so the bees are at a much greater risk of predation by large ground dwelling animals than as a nuisance to homeowners.



Figure 7: Preparing the smokers to place the bees at Classic City High, Spring 2006

At the end of the summer only two of the colonies survived. The third hive ended up without a queen and the queen less drones found refuge in the two other hives. The entomology

class at the high school was informed that the hives must be relocated because the Early Learning Center was to open at the high school by mid-September on that site.



Figure 8: Smoking and placing the hives at Classic City High, Spring 2006

Fall 2006, the Bee Lab at UGA was consulted about the best way to move existing hives. Several options were presented. The first option was to move the colonies to their new location on the grounds of the high school. The second option was to completely relocate the hives until the playground of the Early Learning Center was complete and then returning the hives to the high school. Ultimately the second option was opted for due to the hazard of simply moving the hives nearby, because the bees would return to the old site looking for the hives and could have negative interactions with the Early Learning Center children. By moving the colonies to the UGA Bee Lab in the pre dawn hours before the bees emerged for the day, we were assured that 1) we had all the bees in the colony and 2) the bees would be far enough away to not “look” for the old site. While the bees hives were at the Bee Lab we thought this would be a great

opportunity to take the high school Entomology students on a tour of the Bee Lab so they could see their two colonies and learn about apiculture research at UGA and view honey extraction, and a honey tasting.

All of the high school entomology students attended this field trip. Everyone wore protective veils and armed with smokers for calming the bees, we set out to examine their hives. Half of the students were really interested and involved, while the other half were obviously a bit scared of the bees and hesitant keeping a safe distance away. The interested students asked questions, examined the hives closely identifying cells with eggs, larvae, pupae, marked queens, honey comb and observing a parasitic mite that devastates bee colonies.



Figure 9: Classic City Entomology students learning about bees Fall 2006

One thing that was brought to our attention by the UGA researchers was that the two high school bee hives would require supplemental feeding with sugar water to strengthen the hive and get the bees winter ready. Several of the students were anxious to have the hives returned to the

high school so they could help with these routine (every other day) feedings. It was determined that the hives would be returned to the high school mid-November 2006.

The class was then given the opportunity to taste honey produced by the UGA Bee Lab; all students participated in the tasting and experienced first-hand working with their hives. It was interesting to observe the polarity of students who like bees and those who do not. It was also interesting to see that one of the most interested students actually has a slight allergy to bees and seemed more intrigued and engaged due to his allergy.



Figure 10: High school students tasting honey, learning about extraction and production.



Figure 11: Working the hives at Classic City High, Fall 2008

Each fall Entomology is offered as a science elective at the high school. The entomology class at Classic City learns about the hives through a lecture from a specialist at the University of Georgia Bee Lab. The students work and manage the hives with help from the bee specialists. To date, there is one successful hive that should produce enough excess honey to harvest Spring 2010.

Outdoor Classroom Service-Learning Project

Gardens are creative, living spaces that provide opportunities for interdisciplinary, inquiry-based education as outdoor classrooms designed to encourage direct learning through observation, investigation and other hands-on activities. Outdoor Classrooms can become transformational learning spaces where students can understand dynamics of community action and collaboration by co-creating a garden that enhances the learning community.

As an interdisciplinary service-learning project I partnered with Adult Education, Horticulture and Landscape Architecture and submitted a Scholarship of Engagement (SEGUE) proposal that was funded through the Office of the Vice President for Public Service and Outreach to create the Outdoor Classroom. Objectives of the Outdoor Classroom include: 1) developing resources and lesson plans for entomological, biological, and environmental science education that can be adopted in other schools in Clarke County; 2) promoting interdisciplinary service-learning projects in order to create a model for responding to complex community needs; and 3) providing a learning space to give both UGA and high school students an appreciation for the natural world and increase overall student interest in science, the arts, and community action. The Outdoor Classroom is a space for a number of disciplines to come together, work collaboratively, and learn by doing as they create something with lasting impact. This interactive approach to building the outdoor classroom promotes empowerment among the students and staff at Classic City High thereby ensuring the long-term sustainability of this facility.

The Outdoor Classroom at the high school provides a greatly needed outdoor area for teaching and learning in any subject area at the high school. Students from UGA worked with science teachers and high school students involved in an Art Club to design and implement an outdoor classroom that included installing all of the components of the outdoor classroom such as an aquatic garden, insect garden, teaching area, pathways around the gardens, and an art garden. The Outdoor Classroom is a space for a number of disciplines to come together, work collaboratively, and learn by doing as they create something with lasting impact.

During Spring Semester 2007, fifteen undergraduates and one high school student participated in *Entomology Outreach & Service-Learning* (ENTO 3900). Students attending an *Outdoor Classroom* planning session at Classic City High were introduced to their project

partners, the proposed project site and the service-learning project. Students participated in brainstorming session thinking critically about what they would like to see represented in the Outdoor Classroom (Appendix R). The entomology students felt it was important to focus on various insect habitats including both aquatic and terrestrial environments and made suggestions to the landscape architecture students to for these diverse habitats to be included in the master plan. Entomology's goal for the outdoor classroom was to craft gardens that would attract butterflies, insects and other winged wonders and create an excellent opportunity to learn about insects and arthropods in their natural environment. Gardens specifically created to attract butterflies and other insects will lead to increased fauna, flora and biodiversity of the outdoor classroom by providing natural sources of food and habitat for arthropods. Lastly the entomology students wanted to make sure the chosen plants would be good sources of pollen for the bee colonies placed at the high school the previous spring.

Several project activities for the Entomology students resulted from that meeting. The first was to obtain a soil sample of the future Outdoor Classroom site area and have it analyzed by the Cooperative Extension Service. The second area of focus for the Entomology students was to search for funding and identify potential granting agencies to provide funding that would ensure the continuation and long-term sustainability of the project. Entomology students would also assist in the implementation phase of the project once additional funds were secured and the master plan finalized.



Figure 12: Outdoor Classroom Project Site (View of the Early Learning Center for High School Students)

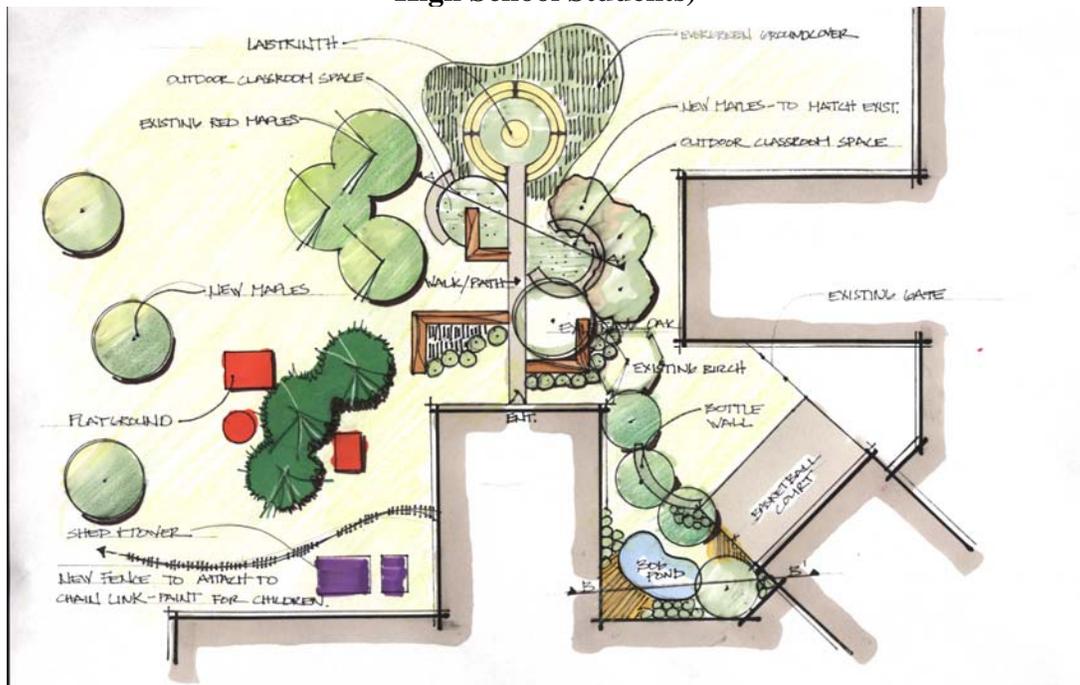


Figure 13: Master Plan Outdoor Classroom

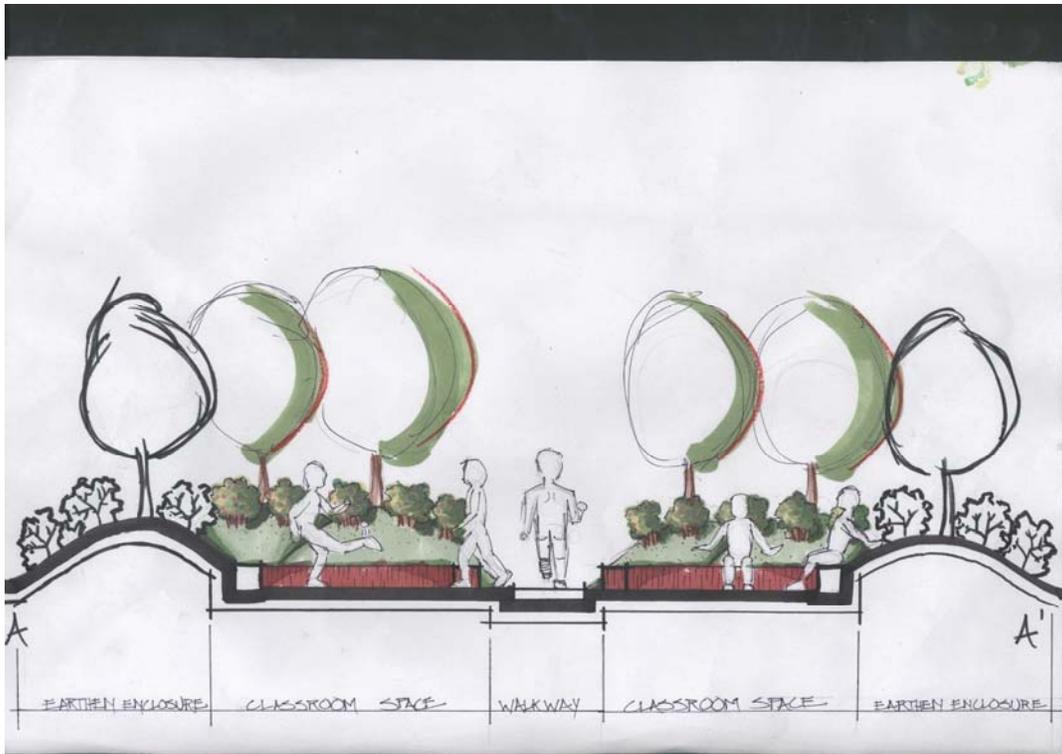


Figure 14: Classroom Space

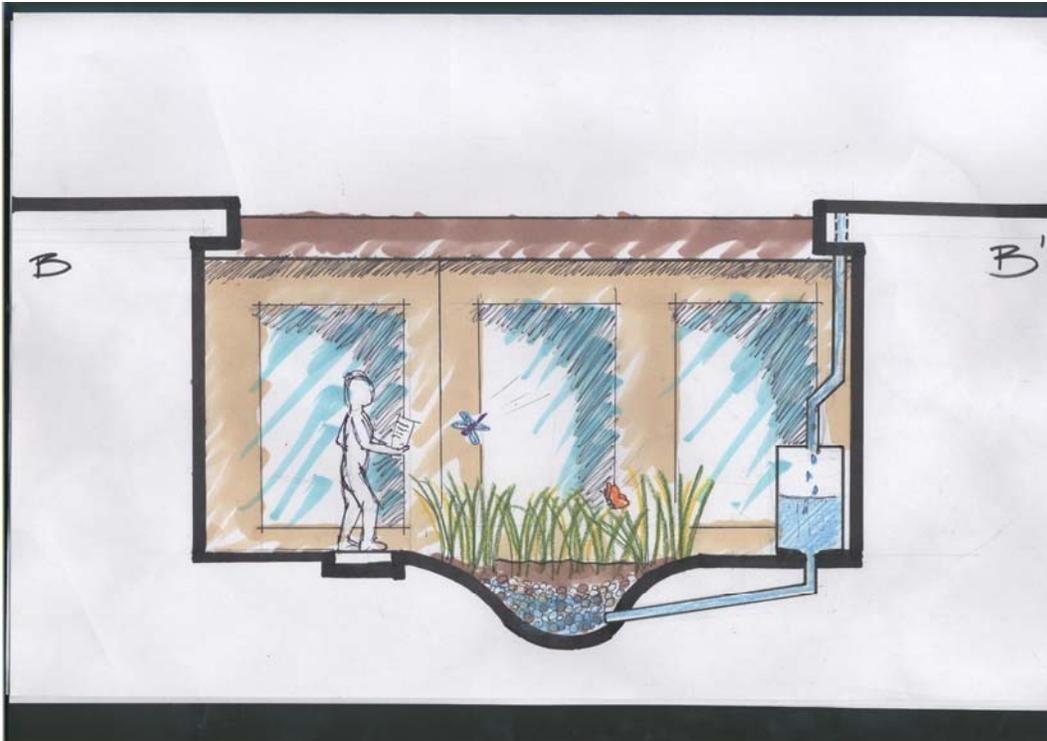


Figure 15: Aquatic Space with Rain Barrel

Insect Natural History in Costa Rica: International Service-Learning

In this research, we report on our study of an international service-learning study abroad course entitled *Insect Natural History in Costa Rica: International Service-Learning* which involves university students, local high school students, and teachers throughout Georgia learning about insect natural history in Athens and in Costa Rica utilizing. The purposes of this study were to understand if an entomology study abroad service-learning class could be developed and implemented. We also wanted to assess the course and evaluate its effectiveness.

The course was divided into three different components. The first part of the semester was spent in Athens discussing background entomology and collecting techniques as well as an orientation about Costa Rican cultural information that would be helpful for the students once they arrived in Costa Rica. The second component was followed by a seventeen day laboratory and field component in Costa Rica. The Costa Rica portion focused on two primary habitats, the tropical wet forest (La Selva, Organization for Tropical Research Field Station near Puerto Viejo) and cloud forest (UGA Costa Rica Campus near Monteverde). The third component of the course was service-learning. During this study students participated in both direct and indirect service-learning projects.

Critical components for creating an environment of increased academic engagement at UGA are service-learning and study-abroad opportunities for undergraduate students. In terms of the number of described species, insects are easily the largest and most diverse group of animals, and that diversity is most conspicuous in tropical latitudes where most of the centers of insect biodiversity lie.

Insects are readily available and easily manageable subjects for the study of biological principles and processes ranging from genetics and reproduction to behavior, ecology, and

environmental and socioeconomic impacts in daily life. The use of insects provides an exceptionally broad array of opportunities to focus on the application of biology. A mutually beneficial relationship can exist between institutions of higher education and their communities. Service-learning, an experiential pedagogy, engages students and faculty to actively participate in their surrounding communities in educationally meaningful ways. Insects are ideal models for demonstrating a broad array of biological and ecological concepts while providing opportunities to focus on the application of biology to solve real-world problems in local communities, as well as those of the international community at large.

Insects are a natural vehicle for promoting cross-cultural understanding and awareness. People of all ages are inherently curious about the habits of insects, as witnessed by the increasing popularity of TV programs that feature insects (Buggin' with Rudd's, Animal Planet). Insects impact humans in diverse ways - as vectors of diseases such as malaria, yellow fever, plague, as competitors for our crops (agricultural pests), as pollinators for numerous crops, as decomposers/recyclers par excellence (cellulose by termites, dung by beetles), as inspiration for art and poetry - to name but a few.

Students in the biological sciences at universities in the U.S. rarely have an opportunity to experience the fauna and flora of the tropics first-hand under the instruction of a knowledgeable guide and instructor. Currently, most study abroad experiences offer general credit for lower level undergraduate courses (e.g., ECOL 1000) and only rarely for upper level courses (e.g., ECOL 3500). *Insect Natural History* (ENTO 3140/3140L) has been offered on campus during Fall and Summer Semesters for many years and is always filled to capacity. Because Entomology is a relatively low enrollment major, the primary audience for this course is the vast

group of students majoring in biological sciences, science or agricultural education majors or graduate students.

In 2001 UGA purchased a farm in the San Luis Valley of the Monteverde region in Costa Rica. Currently, a fully operational campus has been developed on this site. UGA Costa Rica offers inter-disciplinary, field-based learning opportunities and cultural immersion in a tropical cloud forest environment. In Fall 2005, UGA opened the Costa Rica Office on campus in Athens to promote and recruit students to participate in study abroad programs in Costa Rica (UGA Costa Rica 2008). With an office working directly with the Costa Rica campus in Athens coordinating on the ground logistics and local arrangements, various essential and critical on site information and logistics could be handled and facilitated more easily. With a UGA campus in Costa Rica, I felt this was a great opportunity to develop and implement an entomology study abroad course. Fall 2005, I received an International Development Education Awards (IDEAS) grant from the Office of the Vice President for Public Service and Outreach at UGA to develop *Insect Natural History in Costa Rica*.

Costa Rica has a population of approximately 4 million and the capital is San Jose. The country is bordered to the north by Nicaragua, to the south by Panama, to the east by the Caribbean Sea and to the West by the Pacific Ocean. Costa Rica has seven provinces. The official language in Costa Rica is Spanish. Preschool and general basic education is mandatory but not enforced. Though the system is free, many cannot afford the required uniforms and rural schools have no books for students. Daily time spent in school is 3.5 hours since the school class schedule is divided into two sessions in order to accommodate the students. The literacy rate in Costa Rica is of 96% (CIA World Fact Book 2007) and both elementary and high schools are found throughout the country in practically every community.

Biodiversity is the number and types of organisms in an ecosystem, region or environment. Tropical rainforests support the greatest diversity of living organisms on Earth. Although they cover less than 2 percent of Earth's surface, they house an estimated 50% of all life on the planet. The vast numbers of organisms that inhabit the tropical rainforests are immense at an estimated 5-50 million species. Two distinct ecological or life zones were identified for teaching and research while in Costa Rica. La Selva Biological Station is located within the lowland tropical and premontane wet forest. The research station has about 73% of its area under primary tropical rain forest. Tropical wet forests are rainforests that grow in an equatorial belt, where conditions for life are as uniform as is possible on land: temperature, precipitation, and hours of daylight vary little from season to season. Leaves, flowers, and fruit are therefore always available as food for the animal population.

The UGA Costa Rica campus is located in the premontane cloud forest near the Monteverde. Tropical montane rainforest is forest that grows on mountains and above an altitude of 3,300 feet. High montane forest, above 6,600-10,000 feet (2,500-3,000 meters) in elevation, is often manifested as "cloud forest," forest that receives the majority of its precipitation from mist or fog that passes up from the moist, humid lowlands. The trees of cloud forests are typically shorter than those of lowland forest resulting in a less-developed canopy. Cloud forest trees are heavily weighed down with epiphytes that thrive with the abundance of moisture from the passing fog (Monga Bay 2008).

Insect Natural History in Costa Rica: Course Development and Implementation

Summer 2006, the first entomology study abroad course at UGA was offered; *Insect Natural History in Costa Rica: International Service-Learning* (ENTO 3140-3140L) (Appendix S). The primary goal of developing this study abroad course in entomology was for students to

obtain a meaningful international experience to enhance their global awareness of environmental and cultural issues through the use of insects as teaching tools, coupled with structured public outreach experiences.

Long term objectives of the program for include: 1) Provide graduate and undergraduate students with improved teaching and communication skills; 2) Professional development for K-12 teachers; 3) Enriched learning for K-12 students; 4) Strengthened partnerships between UGA and local school districts, 5) Improving science content and teaching at the K-12 level. This program will provide an opportunity to make a mutually beneficial permanent change in science.

The Summer 2006 students were required to prepare a properly mounted ordinal level insect collection. In addition, students were assessed based on their ability to communicate their knowledge of tropical insect natural history and behavior in periodic written reports. At the conclusion of session, student collections were combined and representative specimens were donated to UGA Costa Rica and INBIO with the remaining collections donated to UGA. The summer 2006 service-learning projects were indirect. Although students were not graded on the service-learning portion of the course during this first year, primary emphasis was on journaling and reflections. Students created insect collections and donated them to the UGA Costa Rica campus for their teaching collection. Another collection was donated to two Costa Rican schools in the San Luis area. A third collection was donated to Classic City High. A fourth collection was donated to the Institute of Biodiversity in Costa Rica as a reference collection. A fifth collection was donated to the Insect Natural History Museum at UGA.

In another service-learning project, students presented their collections and gave brief introductions to various insect orders found in their collections to the other UGA Costa Rica groups on campus at that time. The other groups participated (Art, Language & Culture, ESOL,

etc.) and gave mini lectures about their projects and classes as well allowing the campus to community come together and engage one another in this activity. Students also had an opportunity to interact with local citizens at a community dance. This was a wonderful chance for our students to experience another culture with multiple generations represented as the community gathered together at a school for a celebration.



Figure 16: Insect Collection Presentations to UGA Costa Rica Campus 2006

Summer 2007 students were required to develop and implement a field project that examined some aspect of entomology in a temperate environment (Athens, GA) and compare it to a similar short-term study in a tropical environment (San Luis, CR). In addition, students were required to prepare a collection of beetles that were identified to the family level. Representative samples of the insects were donated to local Costa Rican schools to foster a greater appreciation for these animals. A final course requirement was participation in a service-learning project teaching entomology in Costa Rican schools (Appendix T).

Planning for the Summer 2007 outreach and service-learning component of the course was more focused and began approximately two months prior to leaving for Costa Rica. Students brainstormed effective ways to include entomology in the science education and outreach program in the Costa Rican elementary schools. The lesson plan included: an introduction by the UGA class to the students with an explanation of why we were there, a fifteen minute lecture and discussion of the basic anatomy of an insect, an arts and crafts period, snack time, insect related games, a UGA student facilitated insect collecting trip and a live insect zoo.

Once in Costa Rica, insects were collected for the live insect zoo. A representative insect was collected from each of 11 major orders and kept in a small terrarium. All non-dangerous insects were used in hands-on study by the students. Insect collecting kits, snacks, science posters, insect expandables, pencils, and insect erasers were left with the students of San Luis in hopes of providing materials for current lessons and facilitating future scientific endeavors in the classroom.

The first outreach in the Alto San Luis schools was approximately one hour in duration and included approximately forty students. These students ranged from 4th to 6th grades and spoke limited English; the school teacher however did not speak English. The students were split into three groups to rotate between arts and crafts, the live insect zoo, and the matching games. The remainder of the time at the school was spent walking around outside with the students individually or in small groups collecting insects and reviewing the English and Spanish names for each. The outreach was well received by the students and the teacher, and the students were later seen with their nets collecting insects on their own.

Once the group arrived at the school for the second outreach we discovered that the teacher had canceled school for the day, which we later learned, was a fairly common occurrence. All supplies and collecting materials were left at the school with bilingual instructions. The snacks and collecting kits were distributed among the students before school was dismissed. Three of the Costa Rican students remained with the UGA class for a modified outreach to collect insects spending several hours with a particular interest in mariposas (butterflies). The UGA class spent time sharing the English names for the insects the students encountered while learning Spanish names from the students.



Figure 17: Group Insect Collecting with Costa Rican students, 2007

The 2008 study abroad program added a second course in ornithology. *Insect and Bird Natural History in Costa Rica: International Service-Learning* was a combination of Insect Natural History (ENTO 3140/3140L) and Field Ornithology (FORS 4060/6060-4060L/6060L) (Appendix U). All students participating in the program registered for 8 credit hours. Another

addition in 2008 was undergraduates participating in the program from the UGA Griffin and Tifton campuses. Although these students are UGA students, this was the first time we had students join us from our branch campuses.

With the addition of the new course three additional field sites and two additional ecological regions were added as well. Previously the program had visited only two ecological regions; the lowland tropical wet forest and the premontane cloud forest. This year we also visited the Guanacaste Region's tropical dry forest, and the mangrove forests of the Central Pacific Region. Tropical dry forests typically experience an annual hard dry season. The average rainfall is sufficient enough to promote growth of trees, but these trees and plant species must be able to withstand periods of low precipitation and moisture. Many of the tree species in dry forest are also deciduous. During the driest months these species drop their leaves similarly to northern deciduous forest species losing their leaves in the fall and winter. This dry season leaf-drop reduces the water needs of the plant (Bird Zoo 2008).

Mangrove forest is found in silt-rich, saline (brackish water) habitats worldwide, generally along large river deltas, estuaries, and coastal areas. It is characterized by low tree diversity, almost exclusively mangroves, with a low broken canopy. Mangroves are evergreen trees and shrubs that are well adapted to their salty and swampy habitat by having breathing roots that emerge from the oxygen-deficient mud to absorb oxygen (Monga Bay 2008).

The four GIFT participants (two elementary school teachers and two high school teachers) were responsible for coordinating outreach activities for a community festival that was scheduled while we were in the San Luis area. The GIFT teachers also hosted supply drives at their respective schools and gathered donations of school supplies to donate to two elementary schools that we had worked with the previous year, Alto and Bajo San Luis Elementary Schools.

We were informed the day of the festival that the night-time activity where we were expecting to set up our Insect Zoo and outreach activities had been canceled. We were disappointed because up to this point, we had not had an opportunity to interact with the community. This would have been a great learning experience and time for reflection. The teachers did get a chance to take the donation boxes of school supplies to both elementary schools before we left the San Luis area. This was a great experience for Georgia K-12 teachers to interact with Costa Rican teachers and students and experience the public elementary schools first hand.

The second service-learning project was the donation of student insect collections to the teachers in the group for each of their respective schools across Georgia. The original intent was to divide all of the insect collections and take representative insects and create collections for the teachers. Of the eleven insect collections made, eight collections were directly donated to the teachers. This reflected the respect the UGA students had gained for these teachers. This willingness of UGA students to contribute to Georgia K-12 classrooms without being asked indicates that a mutual understanding and appreciation for this educational experience transcended the physical collections and will benefit students in Georgia classrooms for years to come. Upon returning to Athens, two of the students also volunteered to assist one of the elementary school teachers with preparing an insect collection with the insects that had been donated to him. Students also assisted the teacher in setting up a hallway display board about the Costa Rica trip.



Figure 18: Canopy Walk for *Insects & Birds* 2008 Study Abroad Course



Figure 19: Insect Collecting and Birding, 2008



Figure 20: Group photo at Rafiki Safari Lodge, 2008

Entomology Outreach and Service-Learning Results

As an ongoing reflection activity throughout the semester students were asked to participate in two reflection exercises during class. Approximately four weeks into class, students complete a “One Minute Paper”. Essentially the students have one minute to write a question or comment about the course or express a concern. This has shown to be a very effective formative evaluation because it exposed ongoing questions or concerns that the students, for various reasons, had not found answers to. Student responses were anonymous. At the beginning of the following class each of the questions was answered and comments were read and the issues raised were discussed. Students often comment about these responses saying that they wondered or thought about the same thing, or shared common concerns. Having the time limit of one minute also encouraged students to speak freely and write about the first thing that came to mind (See Appendix V, W and X for full responses).

From these responses three themes emerged. First students were learning entomological science content by participating in the various outreaches and through the class service-learning project. Next, students were learning about service-learning as pedagogy and are seeing its usefulness and potential benefits for the community and for themselves. Finally, students were beginning to think about logistics, communication, and program planning and design in relation to the outreaches and the service-learning projects now or later. Working with community partners can be particularly difficult because there are always others to consult with and engage in the decision making process. This is an interpersonal skill that students will serve students well when they enter the workforce and our communities following their graduation. Having experienced the complexities of working with multiple groups simultaneously towards achieving a common goal is an excellent mechanism for building future leaders and learners.

A second formative evaluation that is utilized as an ongoing assessment during the semester is a reflection activity “One Good Thing, One Bad Thing”. Students are asked at the end of class approximately ten weeks into the semester to write down one good thing and one bad thing about the service-learning course, outreach experiences, or the service-learning project for that semester. This was also a great opportunity to address student concerns about the course or to give students an opportunity to reflect about positive aspects. By requiring the students to think about both the good and the bad, it encouraged them to examine an issue through multiple lenses or with different perspectives (See Appendix Y, Z, and A1 for full responses).

These student reflections highlight many of the same attitudes and behaviors that the *One Minute Paper* reflection exercise did, but these reflections appeared to have greater depth. Students were now commenting on things such as communication breakdowns, more thoughtful organization in relation to actual experiences, or in one case a lack of experience. One student

commented on disappointment at going to an outreach that was unattended. Fortunately, this is a rarity with our outreach programs. However, particularly when dealing with parks and nature centers that have planned a weekend program and have been responsible for the promotion of the event, something as simple as bad weather, or the lack of sufficient promotion unfortunately can mean no participants. Another theme was the apparent transition from learners to teachers. Students at this point in the semester (~ten weeks) had taken ownership of the outreaches and are 100% responsible for leading the groups and ultimately teaching community members. Students felt they were educating the community, teaching people something they did not previously know about insects and science, and seeing people being affected positively by their direct interactions. Also, students were learning more themselves about insects through teaching as they were challenging their own personal fears and “ignorance”.

Evaluation measures the impact of the student’s learning experience and the effectiveness of the service in the community. In an effort to understand the impact or success of the four university/high school service-learning projects, focus groups were conducted with the high school students and teachers at the high school. A focus group guide was created to assist with guiding questions that would prompt discussion (Appendix A2).

To determine the needs and to evaluate the program for the university/high school partnership focus groups were conducted with various participants including UGA faculty, staff and students and high school faculty and students (Appendix A3 and Appendix A4). Through these focus groups several needs were determined. The specific needs identified by the high school students were to involve them in pre-planning of future service-learning projects and to have better coordination between UGA and Classic City for all service-learning projects. Future needs-assessments are recommended for high school students to show what their ongoing

interests are. The needs identified by the high school teachers were to develop a resource guide around service-learning to include resource materials for pre, during and post service-learning including reflection, evaluation, implementation and outcomes. One priority identified was to organizationally identify needs for future service-learning projects.

The needs identified from the UGA focus group with faculty and staff were again a resource toolbox with examples of reflection, outcomes, assessments, evaluation, orientation, problem-solving, as well as rubrics for evaluating or grading reflections and journals. Each of these needs will be achievable by creating a resource toolbox of service-learning materials (pre, during and post) that will be utilized primarily by Classic City and UGA faculty and staff.

There are many measurable and immeasurable outcomes of this service-learning project. Classic City students commented that they really enjoyed the course, the collections, and learning about Entomology. It was noted that one student took such an interest in the course that he volunteered to take the live insects home to feed and water them over the weekends. Another high school student demonstrated courage, and excellent speech and communication skills when presenting the Apiary proposal to the superintendent. The collaboration between the high school students and the undergraduates has been exceptional. Each group communicates and listens openly and freely. Dialogue was discussed in several class lectures and the class has been practicing during the semester.

Another outcome is the Classic City Apiary as a financial resource. Each of the three colonies is expected to produce 40 to 50 lbs of honey annually with profits ranging from \$1000 to \$1200. In a few years Classic City will have a functioning apiary that can serve as a learning resource for science classes, or economics and business classes that could help with a market system to aid in selling the honey and developing a business plan.

The Outdoor Classroom is a second outcome of service-learning projects that students in Entomology Outreach and Service-Learning participated in. The Outdoor Classroom is a space for a number of disciplines to come together, work collaboratively, and learn by doing as they create something with lasting impact. This interactive approach to building the outdoor classroom will promote empowerment among the students and staff at the high school thereby ensuring the long-term sustainability of this facility. The project has now been presented at five national conferences as a best practice and innovative idea project.

University Student reflections of the service-learning project

“My stereotypes of at risk students has changed”.

“I thought drop outs were just lazy. Many of these kids have had extremely difficult lives. I can’t imagine dealing with school, having to support a family, living in poverty and having no transportation, but these kids are succeeding”.

“The students (high school) were so excited about this project”.

“It was neat working with so many different disciplines and students (graduate, undergraduate and high school)”.

“Nothing like I have ever experienced. A true collaboration”.

“I felt like I was a part of something bigger, much bigger, that is going to truly make a difference in people’s lives”.

“I am glad Classic City Student are at least interested in the project. Even if they are not sure if they will like it or what it is about”.

These reflections indicate that the entomology undergraduate students participating in the *Entomology Outreach and Service-Learning* course had a change in their attitudes of at risk students and high school dropouts. Students also indicated that the collaborative experience of working with various disciplines and types of students (high school, undergraduate and graduate) was beneficial and something that many of them have not experienced before. It can also be inferred that students experienced a sense of community or a being a part of something much

bigger. This was a transformative experience for students who had never interacted with high school drop outs and were inspired by their willingness and desire to succeed.

Lastly, the long-term partnership between Classic City and the Entomology Department will hopefully set a precedent for other departments and schools in the system to promote sustainable partnerships based on community and school needs. With an Apiary in place and Outdoor Classroom to be implemented in full Fall 2009, a relationship between Classic City and the Entomology department has been established and should be sustained.

Insect Natural History in Costa Rica Service-Learning Results

Science education is rarely offered in most rural Costa Rican schools. One teacher commented on how beneficial it was for the students to see insects as an important part of their world instead of something to “just step on”. Through the service-learning experience UGA students were able to apply the knowledge of insects they had learned from the course including names (both English and Spanish) of the insects they were collecting with the Costa Rican children as well as sharing some of their natural history including habitat and food sources. UGA students also benefited from this interaction with Costa Rican children by learning Spanish and being able to effectively communicate science and information about insects to them and actually teach Costa Rican children in a Costa Rican school. The program benefited the Costa Rican students by exposure to insects and science while simultaneously enhancing the educational experiences and cultural awareness of UGA students. A more informed view of entomology allowed both UGA and Costa Rican students to make more informed decisions to their communities in regard to ecology, conservation, the environment, and food production.

Through the community outreach program and service-learning component Costa Rican citizens, particularly children, were invited to assist and share in the discovery process creating

an atmosphere of interaction between the course participants and local residents for the purpose of sharing knowledge of insect natural history. In the process, students learned about Latin cultures and customs through engagement with community.

Students participating in the course were exposed to a vastly different environment in Costa Rica compared to that at UGA in Athens. This included both the physical environment (tropical rainforest, cloud forest, etc.), and the cultural environment. By encouraging interaction and collaboration with local residents and their children in collecting tropical insects and exploring specific microhabitats (e.g., carrion-feeding insects) UGA students participated in an enriching experience. Their perspective of the world was hopefully enhanced in multiple new dimensions and they are better prepared to succeed in a rapidly changing global society.

Research Question 3 asks what learning outcomes are associated with entomology service-learning courses? As a final reflective activity, students wrote a summary about their experience in the *Entomology Outreach & Service-Learning* class (Appendix K). Students were asked to reflect about what they had learned about society, teaching and learning, science content, suggested future service-learning projects, and other effects such as doing or seeing things differently as a result of this experience. Selected excerpts below capture students' attitudes regarding service-learning (See Appendices A5, A6 and A7 for full responses).

These reflective summaries of student experiences in the *Entomology Outreach & Service-Learning* class demonstrated what students have learned about society, teaching and learning, science content, knowledge and self and personal impacts, such as doing or seeing things differently as a result of these experiences. Students had a clear understanding at the end of the semester what society and community meant in context to themselves and how they could

have positive influences on their communities. Students also had increased their entomological and science content through hands-on teaching and learning activities in the community through the Entomology Outreach Program. Students had a stronger sense of self and had learned more about themselves through these experiences. Lastly, impacts of this course on students seemed positive whether committing to future service-learning or volunteerism or doing and seeing things differently with a sense that they, as individuals or as part of a group, could make a difference in society.

Research Question 4 asks what impacts are associated with entomological outreach education for entomology graduate students, undergraduate students, and community partners? Not only was it important to capture the feelings and attitudes of students enrolled in ENTO 3900 concerning entomological educational community outreach programs, but also to evaluate the program from the perspective of entomology undergraduate and graduate students as well as community members who had requested and participated in these programs. Historically, the H.O. Lund Entomology Student Club coordinated and conducted the outreach program. This group of students had voluntarily coordinated and participated in the outreach program. Being a voluntary program the number of requests always far surpassed the amount of time student volunteers could devote. Therefore, many outreach requests were denied. The entomology undergraduates and graduate students continued to volunteer their time for community outreach programs and the students enrolled in ENTO 3900 valued the time they could spend at an outreach with an entomology student because they could learn some useful information regarding insects in general or insects and arthropods in the Insect Zoo. Entomology undergraduate and graduate students were also very knowledgeable about insect pests and could answer many questions parents or older children might have about insects. It was a general

policy at outreaches that if students were asked a question to which they did not know the answer to state, “That’s a great question. I’ll have to look into that and find out more information”.

Results of Undergraduate, Graduate and Community Surveys

There were fourteen total participants for the undergraduate outreach survey, nine males and five females. 50% of respondents were age 18-22. 28.6% were age 23-27. 21.4% were age 28-32. Nine participants were residents of Georgia. Three were residents of North Carolina. One student was a Florida resident and one was a New York resident. 57.1% of respondents had participated in one to ten outreaches. 21.4% had participated in eleven to twenty outreaches. 21.4% had participated in twenty-one to thirty outreaches (See Appendix A8 for full responses).

There were six total participants for the graduate outreach survey, two males and four females. 16.7% of respondents were age twenty-three to twenty-seven. 66.7% were age twenty-eight to thirty-two. 16.7% were age thirty-three to thirty-seven. One participant was a resident of Georgia. One was a resident of South Carolina. One student was a Washington State resident and three were international students. 33.3% of respondents had participated in one to ten outreaches. 16.7% had participated in eleven to twenty outreaches. 16.7% had participated in twenty-one to thirty outreaches (See Appendix A9).

There were seven female participants for the community outreach survey. Four organizations were located in Athens. One was each located in Monroe, Morrow and Atlanta. 28.6% of the organizations served elementary school age children (K-5). 71.4% of organizations served all ages. When asked how many outreaches UGA Entomology has done with their organizations, 42.9% of organizations have participated in one outreach. 14.3% of organizations have participated in two outreaches. 14.3% of respondents have participated in five outreaches. 28.6% of organizations have participated in six or more outreaches with UGA Entomology.

100% of respondents will continue to request Entomology outreaches in the future (See Appendix A10 for full responses).

Summary

The current state of American higher education and undergraduate education has been under scrutiny as discussed by Bok (1984) and Boyer (1990) for years. Issues and challenges in the assessment of higher education, particularly undergraduate education, can be seen at each organizational level of an academic institution including course, departmental, college and university. Particular issues that span these various units include; a clear and concise understanding of what assessment is, how assessments differ, what information is trying to be obtained, and program plans for incorporating the assessment findings into institutional (college, department, course) change. According to Astin (1993) the IEO Model of Assessment (Input, Environment and Output) could serve as a guide when addressing specifically identified issues and challenges.

The findings from this investigation of the impact of Entomology Outreach and Service-Learning on college student participants ultimately points to three outcomes: increase in entomological science content, more civic awareness, and interpersonal growth. It is evident that by the end of the semester these students are knowledgeable about basic insect science, can site identity common insects, are familiar with natural history, are knowledge about maintenance and curation of live and preserved insects, and are aware of collecting and handling techniques. Through participation in the outreaches and the service-learning projects students seem to get a sense of their role in society and seeing their interactions and behaviors through a different context. Students also seem to grow as individuals through interpersonal skills such as team building, collaborative learning, time management and creativity, risk taking, persistence,

meticulousness, ethical or social consciousness, empathy, cultural sensitivity and social responsibility.

In 2005 an interdisciplinary service-learning project was developed between the high school and a group of University of Georgia faculty, staff and students interested and engaged in service-learning. The primary goal of the partnership was to cultivate dialogue and projects between Classic City and UGA involving four projects between four disciplines; Political Science, Entomology, Business and Adult Education addressing community needs as defined by Classic City High School. The goals of the 2005 partnership were met and the projects created were sustainable. Jittery Joes is currently operating in the high school. The Apiary is active and has one strong hive that should produce honey Spring 2009.

The 2007 interdisciplinary service-learning project objectives of the Outdoor Classroom included: 1) developing resources and lesson plans for entomological, biological, and environmental science education that can be adopted in other schools in Clarke County; 2) promoting interdisciplinary service-learning projects in order to create a model for responding to complex community needs; and 3) providing a learning space to give both UGA and high school students an appreciation for the natural world and increase overall student interest in science, the arts, and community action. Although the Outdoor Classroom has not been fully implemented, there is work being done towards the project. Supplies have been purchased and placed in a storage shed funded by the SEGUE grant at UGA. Picnic tables and various garden decorations have also been purchased and placed at the school. The Spring 2009 *Entomology Outreach and Service-Learning* course will work with Horticulture to place drought resistant plantings at the school and actually create the outdoor classroom space.

Although the Outdoor Classroom is an ongoing project it is a space for a number of disciplines to come together, work collaboratively, and learn by doing as they create something with lasting impact. This interactive approach to building the outdoor classroom will promote empowerment among the students and staff at the high school thereby ensuring the long-term sustainability of this facility. Insects are ideal models for demonstrating biological and ecological concepts while providing opportunities to focus on the application of biology to solve real-world problems in local communities. Entomology's goal for the outdoor classroom was and still is to craft gardens that would attract butterflies, insects and other winged wonders as well as to create a wonderful opportunity to learn about insects and arthropods in their natural environment. Gardens specifically created to attract butterflies and other insects will lead to increased fauna, flora and biodiversity of the outdoor classroom by providing natural sources of food and habitat for arthropods. Entomology students partnered with high school students towards creating these specialized gardens for collecting and observing insects.

Service-learning was an integral component of the course including student participation in the idea generation and collaboration phase of planning the Outdoor Classroom through a continuous series of on-going dialogue and open communication with the project partners and the high school. Another service-learning component engaged the high school and UGA students in community outreach programs in the Athens area and the annual Insect Zoo.

Insect Natural History in Costa Rica has been a successful and sustainable study abroad program. Enrollment has increased annually and the program was expanded in 2008 when Field Ornithology was added. The service-learning projects associated with the study abroad courses continue to change as well. Projects have ranged from indirect service (donating insect collections to Costa Rican school, Georgian schools and the UGA Costa Rica campus) to direct

service going into two elementary schools and engaging local children in science education. The range of these service-learning projects as well as adding the birding course in 2008, demonstrated the ongoing dynamics of this program. The target enrollment for the course is 15 students total. This is a manageable number logistically for a field based study abroad course. This also allows for more individual interaction between the faculty members, the teaching assistants, the K-12 teachers and the program director. The varying backgrounds of all of the participants create a fluid atmosphere where engaged hands-on learning is actively utilized as pedagogy.

Service-learning and study abroad opportunities are critical components of UGA undergraduate programs creating an environment of active academic engagement. Insect Natural History in Costa Rica allows students to obtain a meaningful field biology experience while enhancing their awareness of global, environmental, and cultural issues. Public outreach and service-learning experiences include providing insect collections to local Costa Rican schools, and teaching San Luis elementary students about local insects.

The entomology service-learning course in Costa Rica has resulted in benefits for all participants including undergraduate and graduate students, high school students, K-12 teachers and the Costa Rican community through public outreach and community engagement experiences. Although the extent to which the service-learning experience increased or reinforced the entomological knowledge of the UGA students is hard to determine -- the information presented to the Costa Rican children went as in-depth as sight identification of more prevalent and more common insects, their common names, and some natural history -- the UGA students did stand to gain in other ways. According to a study done by Vogelgesang and Astin (2000) an outcome of service learning among college students is the sustainable

development of civic engagement. Students participating in the Costa Rican outreaches were able to interact with a community arguably different from their own, learning about the community and responding to a specific need. Actively working to meet specific needs in the community may translate into active roles of civic engagement later (Billig 2002).

The students of the Costa Rican schools may have also gained an increased ability to maintain civic engagement. The scientific education offered in most rural Costa Rican schools may be missing at times and lacking at worst. An enlightened view of entomology may allow these students to make more informed decisions and contributions to their communities in ecology, conservation, and even crop production. The benefits of a service-learning teaching exchange program in Costa Rica were broad. The programs provided benefits for the students taught, the U.S. college students and teachers, the Costa Rican college students and teachers and their community as well as educational reinforcement, and increased civic engagement. Prioritizing multicultural literacy, citizenship, and education/experience through entomological teaching and service-learning will be of benefit to both our students and the Costa Rican students'.

CHAPTER 5

MEASURING CIVIC ENGAGEMENT IN SERVICE-LEARNING

Purpose

This research aims to investigate whether students exposed to a service-learning class will show more change with regard to specified dependent variables over time. We wanted to examine students' attitudes before and after the class to see if participating in the class had any effect on their level of civic engagement. It was hypothesized that exposure to service-learning (independent variable), would result in change with regard to the different dependent variables, namely social responsibility, civic engagement, school engagement, confidence and relationships, personal empowerment and future civic engagement.

Internal Reliability and Validity of Constructs

Coefficient Alpha or Cronbach's Alpha is a comprehensive synthesis and discussion of various methods for estimating internal consistency. Alpha can be used to estimate the internal consistency of items which are dichotomously scored or items which have a wide range of scoring weights. It was decided to determine the reliability of the different scales in the context of this study by making use of Cronbach's α -coefficient. The internal consistency as indicated by Cronbach's α -coefficients was determined by means of the SPSS-computer programme (SPSS Incorporated, 2003). It is important to note that the coefficients were calculated for a relatively small group (thirty-seven participants).

Anastasi and Urbina (1997) discussed reliability as it refers to the consistency of scores obtained by the same persons when they are reexamined with the same test on different

occasions. The concept of reliability is an error of measurement of a single score in order to predict the range of fluctuation likely to occur in a single individual's score as a result of irrelevant or unknown chance factors. A correlation coefficient (r) expresses the degree of correspondence, or relationship, between two sets of scores.

The construct validity of a test is the extent to which the test may be said to measure a theoretical construct or trait. Each construct is developed to explain and organize observed response consistencies from established interrelationships among behavioral measures.

Construct validation requires the gradual accumulation of information from a variety of sources. Factor Analysis was developed as a means of identifying psychological traits and is particularly relevant to construct-validation procedures. It is a refined statistical technique for analyzing the interrelationships of behavior data. Factors are unobservable variables, but like any other variables they may be correlated. Some rotations of the factor loadings result in correlated factors: others result in uncorrelated factors.

Statistical analysis

Students' responses to Q6-Q42 are used for analysis with a PROC TTEST in SAS. Most of these questions are on a five-point Likert scale, with one corresponding to "strongly agree" and five corresponding to "strongly disagree". A few other questions are on a six point scale. In any case, a low score (such as one) should correspond to high responsibility or engagement, while a high score (such as five) should correspond to low responsibility or engagement. However, after careful examination, we found that the following questions are reversed coded with a high score meaning high engagement: Q11, Q12, Q22, Q27, Q30, Q31, Q33, Q34, Q35, and Q36. Thus, the first step is to correct the coding of these questions, so that the coding of questions is consistent.

Since each subject was measured twice, before and after they took the course, an appropriate approach to examine any attitude change due to the course is to take the difference between the pre survey and the post survey for each subject and test whether the mean difference of all the thirty-seven participants is greater than zero (difference is greater than zero = engagement increases). In other words, we can use a paired-t test. We first do this for each individual question, and then for each subscale.

Results

Results are summarized in Figure 41. The first column lists question numbers. The second column shows the sample size. The third column shows for each question the mean of the differences (difference = pre - post) of the 37 students. The fourth column shows for each question the standard deviation of the differences of the 37 students. The fifth column shows the standard error of the estimated mean (column 3). Columns 6 and 7 give the t statistic and the associated p-value.

Note that since a low score means high engagement. If engagement increases after the course, then the post score will be lower than the pre score, i.e. the difference will be positive. Since it is interesting to test whether responsibility/engagement increases after the course, we should use one-tailed tests. That is, if we set the significance level at 0.05, then any engagement with a positive mean difference and a p-value ≤ 0.10 ($=0.05*2$) is determined to increase significantly after the course.

As shown in Figure 41, the differences of Q24, Q30, Q36, Q41, Q42 and SS6 are significantly positive, meaning that these engagement aspects significantly increased after the service-learning course. It appears that the course did not affect other aspects of engagement/responsibility.

Table 5: Results of Quantitative Service-Learning Study

Corresponding Q# in Questionnaire	N	Mean	Std Dev	Std Err	t Value	Pr > t
Q6	37	0.216	1.004	0.165	1.310	0.20
Q7	37	0.054	0.664	0.109	0.490	0.62
Q8	37	-0.027	0.897	0.148	-0.180	0.86
Q9	37	0.108	0.906	0.149	0.730	0.47
Q10	37	0.081	0.759	0.125	0.650	0.52
Q11	37	0.162	0.958	0.158	1.030	0.31
Q12	37	-0.054	1.246	0.205	-0.260	0.79
Q13	37	-0.054	0.524	0.086	-0.630	0.53
Q14	37	0.054	0.621	0.102	0.530	0.60
Q15	37	0.027	0.552	0.091	0.300	0.77
Q16	37	0.189	0.739	0.122	1.560	0.13
Q17	37	-0.108	0.809	0.133	-0.810	0.42
Q18	37	0.027	0.645	0.106	0.250	0.80
Q19	37	0.135	0.751	0.124	1.090	0.28
Q20	37	0.081	0.364	0.060	1.360	0.18
Q21	37	0.108	0.614	0.101	1.070	0.29
Q22	37	-0.135	0.948	0.156	-0.870	0.39
Q23	37	-0.054	0.880	0.145	-0.370	0.71
Q24	37	0.270	0.871	0.143	1.890	0.07
Q25	37	-0.081	0.640	0.105	-0.770	0.45
Q26	37	0.189	0.739	0.122	1.560	0.13
Q27	37	-0.027	0.833	0.137	-0.200	0.84
Q28	37	-0.027	0.552	0.091	-0.300	0.77
Q29	37	-0.081	0.595	0.098	-0.830	0.41
Q30	37	0.243	0.723	0.119	2.050	0.05
Q31	37	0.054	0.941	0.155	0.350	0.73
Q32	37	-0.351	1.184	0.195	-1.810	0.08
Q33	37	0.324	1.600	0.263	1.230	0.23
Q34	37	-0.162	0.727	0.120	-1.360	0.18
Q35	37	0.351	1.585	0.261	1.350	0.19
Q36	37	-0.460	1.660	0.273	-1.680	0.10
Q37	37	0.135	1.417	0.233	0.580	0.57
Q38	37	0.000	1.080	0.178	0.000	1.00
Q39	37	0.081	0.862	0.142	0.570	0.57
Q40	37	0.162	0.928	0.153	1.060	0.30
Q41	37	0.351	0.789	0.130	2.710	0.01
Q42	37	0.243	0.760	0.125	1.950	0.06

SS1	37	0.405	3.166	0.521	0.780	0.44
SS2	37	0.162	2.316	0.381	0.430	0.67
SS3	37	0.378	3.781	0.622	0.610	0.55
SS4	37	0.108	1.242	0.204	0.530	0.60
SS5	37	0.135	2.974	0.489	0.280	0.78
SS6	37	0.838	3.032	0.499	1.680	0.10

Conclusion

An attitude is often defined as a tendency to react favorably or unfavorably toward a designated set of questions or problems. It is evident that attitudes cannot be directly observed but must be inferred from behavior, both verbal and nonverbal. The concept of attitude is said to predict response consistency with regard to certain categories of stimuli. In actual practice, the term “attitude” has been most frequently associated with social stimuli and with emotionally toned responses and often involves value judgments.

Our findings indicate that after participation in a service-learning class, students’ responses on the service-learning survey indicate some differences in their views regarding civic engagement and future intentions of civic engagement as summarized in Table 5. We hypothesized that students enrolled in a service-learning class would report an increased level civic engagement after this experience and were surprised to find no significant change in most of the constructs identified. Students self select to enroll in service-learning courses. Students with high levels of civic engagement may have a greater tendency towards registering for these courses which could explain the lack of difference over time. However, our findings indicate that participation in a service-learning class does impact student self-reports on civic engagement and we believe these changes are indications that service-learning has the capacity to influence students in ways that lead to more consequential learning and possibly greater civic engagement.

In this quantitative study, we found service-learning participation increased civic engagement, attitudes about civic engagement and attitudes about future civic engagement. We feel these results add examples to the value of service-learning in university science courses and may demonstrate a means for other instructors to measure the potential positive impact of service learning for university students.

CHAPTER 6

SUMMARY AND IMPLICATIONS

Since there have been no publications about service-learning in entomology, this established the justification for the current research project. In 2006, two service-learning courses were created in the Department of Entomology at UGA, *Outreach and Service-Learning* (ENTO 3900) and *Insect Natural History in Costa Rica: International Service-Learning* (ENTO 3140-3140L). One purpose of this study was to develop, implement, assess and evaluate science service-learning in entomology. The second purpose was to examine the effects of service-learning on students' civic outcomes.

In order to evaluate effectively these two service-learning courses in entomology at UGA a triangulated mixed method design was chosen using simultaneously collected qualitative and quantitative data. Specific research questions addressed included:

1. What is the status and distribution of domestic and international service-learning in Entomology programs nationwide;
2. Can domestic and international service-learning courses be developed and implemented in the entomology curriculum at UGA;
3. Are entomology service-learning courses successful;
4. Does participating in science service-learning (domestically and internationally) affect students' civic outcomes;
5. How do entomology graduate students, undergraduate students, and community partners view entomological outreach education?

Ultimately, this research provided findings about the capacity of science service-learning in entomology, both locally and abroad, to influence students' views, attitudes and behaviors regarding civic engagement, teaching and learning, and how these changed views are associated with academic achievement and the various components inherent to service-learning courses which are significant in bringing about desired outcomes.

The culminating work of this doctoral study provided a synthesis of our attempts to investigate the research questions outlined above. In investigating research question one, we surveyed 65 Entomology Department Head and Unit Administrators using both quantitative and qualitative methods. The results of this survey demonstrated the present state of service-learning in Entomology departments and units throughout the United States.

For investigating research questions two and three, we relied on qualitative data in the form of journal entries, course-related reflection activities, and final reflective summaries from fifty-nine students enrolled in *Entomology Outreach and Service-Learning* and *Insect Natural History in Costa Rica* from Spring 2006 to Summer 2008. For the investigating research question four, we relied on qualitative and quantitative data in the form of open and closed ended surveys. Participants for the qualitative portion include community partners, entomology undergraduate students, students enrolled in the entomology service-learning courses, and entomology graduate students. Research question five determined if students' civic outcomes were affected by participating in a science service-learning class. A pre and post quantitative design was employed with a forty-two item Likert-scale instrument which asks students to report attitudes and behaviors related to civic knowledge and skills, social responsibility, interpersonal growth, time management and future intentions of being involved in service-learning. Participants for the quantitative portion include students enrolled in two entomology service-learning courses at UGA and students enrolled in a college service-learning.

In Chapter 2 of this dissertation, we presented a review, which synthesizes literature from a range of service-learning areas. We examined the need for improvement in undergraduate education in the Science, Technology, Engineering and Mathematics (STEM) disciplines and suggest service-learning as pedagogy towards this improvement goal. Also, literature about

assessment and evaluation was discussed. Chapter 3 provides research methods and data collection techniques utilized throughout this dissertation. Chapter 4 provides details about course development and implementation of *Entomology Outreach and Service-Learning*. We also discussed international service-learning and outlined steps toward developing entomology's first study abroad course, *Insect Natural History in Costa Rica*. We reviewed data from undergraduates, graduates and the community about the entomology outreach program and highlighted the Apiary and the Outdoor Classroom service-learning projects. Chapter 5 examined the effects of service-learning on civic engagement in science service-learning courses. Finally, in Chapter 6 of this dissertation we provided a summary of this document as well as implications for research in service-learning we believe have been supported by our findings.

Future research will include additional assessments of students enrolled in service-learning classes; however, more well-defined indicators are needed. Attitudes of students in service-learning classes should be compared with attitudes of students not in service-learning classes across various disciplines to give insight into the true effect of service-learning on pre-determined behaviors. Lastly, additional research and ongoing evaluations will be needed of our service-learning partnerships and projects.

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APPENDICES

APPENDIX A

SERVICE-LEARNING IN ENTOMOLOGY DEPARTMENTS/UNITS (CEDA SURVEY)

This survey is being conducted to determine the status of Service-Learning in Entomology Departments or Units throughout the United States. I thank you in advance for your participation in this > 5 minute survey. Results of this survey will be distributed to CEDA members.

1. Please provide the following demographic information.

Please provide the following demographic information. Name:

Institution/Department:

State:

2. Most define service-learning as a teaching method that combines instruction in a subject with a service project or activity for a community or organization that acknowledges the students' contribution. Students learn while serving and grow through reflection on and recognition of their contributions. Does your institution offer any courses involving service-learning or courses with a service-learning component?

Most define service-learning as a teaching method that combines instruction in a subject with a service project or activity for a community or organization that acknowledges the students' contribution. Students learn while serving and grow through reflection on and recognition of their contributions. Does your institution offer any courses involving service-learning or courses with a service-learning component? Yes

No

3. Does your institution have an Office of Service-Learning or something similar coordinating service-learning on campus?

Does your institution have an Office of Service-Learning or something similar coordinating service-learning on campus? Yes

No

If "Yes" please provide the name

4. Has your college/university administration shown an interest in promoting or incorporating service-learning on your campus?

Has your college/university administration shown an interest in promoting or incorporating service-learning on your campus? Yes

No

5. Are there funding opportunities available at your institution that faculty or staff can apply for to develop service-learning programs? (For example, UGA's Office of Public Service &

Outreach offers annual Seed Grants to promote Outreach and Service-Learning, Scholarship of Engagement Grants, for both domestic and international service-learning projects.)

Are there funding opportunities available at your institution that faculty or staff can apply for to develop service-learning programs? (For example, UGA's Office of Public Service & Outreach offers annual Seed Grants to promote Outreach and Service-Learning, Scholarship of Engagement Grants, for both domestic and international service-learning projects.) Yes

No

If "Yes" please specify funding source

6. Does your department or unit offer service-learning courses or courses with a service-learning component?

Does your department or unit offer service-learning courses or courses with a service-learning component? Yes

No

If "Yes" please specify course/courses

7. Does your department offer study abroad service-learning courses or study abroad courses with a service-learning component?

Does your department offer study abroad service-learning courses or study abroad courses with a service-learning component? Yes

No

If "Yes" please specify course/courses

8. Does your department have an educational community outreach program?

Does your department have an educational community outreach program? Yes

No

If "Yes" please provide the name

9. Can students receive course credit for participating in educational community outreach programs?

Can students receive course credit for participating in educational community outreach programs? Yes

No

If "Yes" please specify course/courses

APPENDIX B

REFLECTION METHODS

- Journaling
- Analyzing metaphors
- Completing a life history (Autobiography)
- Using literature to stimulate critical consciousness
- Critical thinking as a major body of reflection:
- Examples of Critical thinking:
- Lecture to model Critical thinking
- Critical Incident Questionnaire (CIQ)
- Scenario Analysis
- Critical debate
- Structured Critical Conversation
- Critical reading
- The Critical Proactive audit (Brookfield)
- Particularly useful in service learning
- Discuss and/or have a speaker on a certain issue that relates to the students' service experience.
- Have guided discussion questions in large or small groups
- Find events in the community that students can attend together and debrief afterwards.
- Ask students to create a map that shows how their service learning experiences connect to larger world view.
- Write letters-to-the-editor or to government officials that address issues important to the community
- Have students make a collage to express how they view their service site and their service.
- Reflection-in-action: "what are we doing while we are doing it"
- Mindfulness - connection the reflection to the body
- Free-writing - stream writing, stream of continuous writing
- Reflection-on-action: "Now that it is over, I'll take time to reflect" (considered to an analytical exercise to give new perspectives on experiences, changes behaviors and commitments to action. (www.servicelearning.org))

APPENDIX C

CRITICAL REFLECTION

The critical reflection paper is an effective medium for creatively and critically reflecting on your service-learning experiences. The following is a suggested format for the types of things you might want to include in the paper:

1. Preconceptions

Discuss some of the assumptions and expectations you had with regard to -the community interactions -the students the course content, i.e., notions of service, civic engagement, community, democracy and so on -the activities -global and local issues -the history, culture and language of the region :your participation - thing you thought you might accomplish and/or participate in possibility for social change and individual/community learning

2. Critical Incidents & Experiences

Describe some of the most significant events that you experienced. What were your thoughts, feeling and opinions about the experience? The following are suggested themes:

- group interaction
- community interaction
- language learning
- critical reflection
- service activities
- group discussion
- seminars
- presentations
- facilitation
- personal growth

3. Post-Program Analysis

Please analyze and interpret the experiences you mention above in terms of what you read, your reflection and your dialogues with the instructors, students and the community. Again, suggested themes below.

-Any personal changes taking place? -Any lifestyle changes occurring? Future career/study goals? What kind of impact did the service experience have on your way of looking at the world and your role in the world? -Did your experience have an impact on the way you view social problems? Any surprises? Or Any lingering questions

The above materials adapted from: Kiely, R (2002). Toward an expanded conceptualization of transformational learning: A case study of international service-learning in Nicaragua. Cornell University. Dissertation Abstracts International, 63 (09A),~ 3083

APPENDIX D

PRE REFLECTION ACTIVITIES

1. **Pre-service questionnaire:**

The questionnaire can serve as a starting point to engage in dialogue about the various aspects of service learning. It is important to explain the preliminary service learning framework in place (but still open for negotiation) and some of the critical expectations that the facilitators and community contacts might have with regard to the service program. Questions the facilitators develop should pertain to the context of the community that students will be entering, as well as the type of service program that is being implemented. Be sure to include questions that initiate dialogue on the meaning of service and critical reflection as well as motivations and expectations on participation. Students should begin to think about developing questions with regard to thoughts, feelings, concerns and preconceptions relates to the upcoming service activity

2. **Imagining:**

As part of the pre-orientation strategy, it is important to prepare to student for entering into another culture. One effective way of doing this, is to create activities that allow the student to imagine what its like to be the "other." By imagining the "other;" the student will begin the process of reflecting on what it's like to be a member of the community in which he/she will be doing service activities.

3. **Critically Reflective Journal:**

The facilitator should explain at the outset what a critically reflective journal entails (see handout)

4. **Building a Participatory Evaluation Process**

The group/community should collaboratively decide on how it wants to evaluate the service learning program.

5. **Other activities include:**

Inviting community members in to speak to the group or participate in an icebreaker activity to get to know one another, to better understand the community, its history, culture, language, typical problems and needs, and so on...

Inviting experts, student alumni or practitioners to present to the group on a particular problem and/or community's history and culture.

Setting up one day group building service project or create role play games as part of the group building process. Developing trust and rapport early on tends to indicate whether a group will coalesce and learn how to work together effectively.

Literature searches on the community, and the types of issues and problems that the service activities are addressing.

APPENDIX E

DURING REFLECTION ACTIVITIES

1. **Community Exploration:**

This refers to getting students out into the community. We send students to interact with the local community. Students also initiate interviews and conversations with locals to get an understanding of local customs, language, history and so on. Students can begin to create an inventory of needs and problems to be addressed. This inventory can serve as the initial basis for group reflection and potential research topics or help the new students the following year to conduct research in a more productive and consistent manner, so that the service learning process is ongoing, despite the change of faces from year to year. Photo albums are useful for documenting activities and for, making recommendations for future activities.

2. **Research Activities:**

Part of the process of the community-based participatory action research is to identify and investigate with the community local problems, needs, resources, assets, barriers, key stakeholders, existing groups, prior approaches, contextual factors and historical perspectives. PAR is a more effective way to collaboratively undertake mutual research that values local knowledge as vital to understanding and addressing a local problem and/or issue.

3. **Check in/Check out:**

Check in/Check out is an evaluative strategy to ensure or "check" to see that everyone is OK, that the democratic process or any procedures that were negotiated are being enforced and respected, and that everyone feels comfortable with the direction of the service project, the handling of issues, community/student/facilitator relations and so on. Check in and Check out can occur at any time, but are best before and after group discussions. It is a nice way to reflect on the importance of group and community decision making and reflection processes.

4. **One good thing and One bad thing:**

This is a group reflection strategy in which everyone in the group expresses or describes one good thing and one bad event/experience that occurred during the day's activities. It causes the group to develop a consistent group reflection dynamic and ensures that people reflect and share common/distinct ways of viewing activities and experiences.

5. **Informal Spontaneous Discussion:**

This activity is similar to seizing on "teachable moments" in order to spark discussion on a particularly challenging issue and/or problem. It is a nice way to foster critical reflection either one on one or as a small group.

6. **Interaction w/ group, facilitator and the local community**

Interaction is essential to maintaining a critical edge. Students need space for critical reflection on their own, but it is highly recommended that activities help initiate interaction with the community and students as much as possible. This ensures that students get to view issues and problems from a variety of lenses - a necessary part of the process of critical reflection.

7. Community Presentations & Dialogues:

Asking community members to give presentations to the group is another way to share a variety of perspectives on important community issues. Students are more apt to see the complexity of a community problem by hearing multiple voices on the same issue.

All of the service activities above should help students engage in a creative and interactive dialogue with other students, the community, the facilitators and with themselves. Interaction, dialogue and individual space are all important tools for providing students with alternative ways to view the world. These strategies also help students, the facilitators and the community build solidarity, trust and rapport. All of these activities serve to facilitate greater critical reflection in an ongoing manner.

APPENDIX F
CONSENT FORM

I agree to take part in a research study titled “Entomology Outreach & Service-Learning”, which is being conducted by Marianne Robinette, Department of Entomology, University of Georgia, 706-542-1238 under the direction of Ray Noblet, Entomology, UGA. My participation is voluntary; I can stop taking part at any time without giving any reason, and without penalty. I can ask to have information related to me returned to me, removed from the research records, or destroyed.

The purpose of the study is to observe if service-learning in Entomology increases students’ intentions to become involved in further community service and outreach education in the future.

I will not benefit directly from this research.

The procedures are as follows: A pre- and post-Civic Action scale test (simply a structured interview on paper) will be administered before and after the service-learning project which measures intentions to become involved in the future in some community service or action. No discomforts or stresses are expected. Anonymous student reflections will also be utilized in the research project.

No risks are expected.

There will be no deception.

Any information that is obtained in connection with this study and that can be identified with me will remain confidential unless required by law.

The researcher will answer any further questions about the research, now or during the course of the project, and can be reached by telephone at: 706-542-1238.

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

Name of Researcher
Telephone: _____
Email: _____

Signature

Date

Name of Participant

Signature

Date

Please sign both copies, keep one and return one to the researcher.

APPENDIX G

STUDENT SERVICE-LEARNING SURVEY

1. What is the first letter of your first name?

2. What are the first four letters of your last name?

3. How old are you?

4. What year are you in college/school?

5. What is your gender?

- Male
- Female

6. As a student, I believe that taking care of people who are having trouble taking care of themselves is everyone's responsibility.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

7. As a student, I enjoy being around people whose backgrounds and experiences are different from mine.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

8. As a student, I am usually motivated to take advantage of opportunities to learn more than the minimum required to pass the tests.

- Strongly Agree
- Agree
- Neither Agree nor Disagree

Disagree

Strongly Disagree

9. As a student, I often seek out challenging opportunities that test my skills and abilities.

Strongly Agree

Agree

Neither Agree nor Disagree

Disagree

Strongly Disagree

10. As a student, I have a sense of “usefulness” in relation to my community; e.g., I know who to talk to so that my concerns and ideas will be heard.

Strongly Agree

Agree

Neither Agree nor Disagree

Disagree

Strongly Disagree

11. As a student, I believe that helping a person in need is something people should do only for friends or relatives.

Strongly Agree

Agree

Neither Agree nor Disagree

Disagree

Strongly Disagree

12. As a student, I believe that there is not a whole lot to be learned from old people.

Strongly Agree

Agree

Neither Agree nor Disagree

Disagree

Strongly Disagree

13. As I student, I believe that, on a project, it is everyone’s responsibility to make sure the work gets done.

Strongly Agree

- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

14. As a student, I am a good team player.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

15. As a student, I know how to get things done.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

16. As a student, I am aware of the problems in my community and which organizations are working to address them.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

17. As a student, I believe that you should nearly always be paid for helping others.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

18. As as student, I usually treat other people with dignity and respect, regardless of who they are or where they come from.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

19. As a student, I believe that being actively involved in community issues is everyone's responsibility, including mine.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

20. As a student, I believe that young people like me can have a positive impact on schools and/or communities.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

21. As a student, I want to help other people, especially those who have special needs because of their economic, racial, social, mental, or physical situation.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

22. As a student, I believe that most problems will solve themselves if you just leave them alone.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree

Strongly Disagree

23. As a student, I would have no problem working with a person whose race or ethnicity differs from mine.

Strongly Agree

Agree

Neither Agree nor Disagree

Disagree

Strongly Disagree

24. As a student, I think that students should be required to perform service projects in the community in order to graduate.

Strongly Agree

Agree

Neither Agree nor Disagree

Disagree

Strongly Disagree

25. As a student, I believe that people with disabilities can hold jobs and contribute to society.

Strongly Agree

Agree

Neither Agree nor Disagree

Disagree

Strongly Disagree

26. As a student, I am concerned about the problems and needs of my fellow human beings.

Strongly Agree

Agree

Neither Agree nor Disagree

Disagree

Strongly Disagree

27. As a student, I believe it is up to the "experts" to solve problems in my community.

Strongly Agree

Agree

- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

28. As a student, I have a generally positive attitude about school.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

29. As a student, I believe that I can change what might happen tomorrow by what I do today.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

30. As a student, I have trouble linking learning in school to real life.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

31. During an average week, how many hours do you spend doing homework?

- No time at all
- Less than 1 hour
- 1 - 2 hours
- 3 - 5 hours
- 6 - 10 hours
- 11 or more hours

32. During an average week, how many hours do you spend watching tv?

- No time at all

- Less than 1 hour
- 1 - 2 hours
- 3 - 5 hours
- 6 - 10 hours
- 11 or more hours

33. During an average week, doing volunteer work to help other people (like hospital, day care, food pantry, youth program, or community service agency)?

- No time at all
- Less than 1 hour
- 1 - 2 hours
- 3 - 5 hours
- 6 - 10 hours
- 11 or more hours

34. During an average week, how many hours do you spend attending worship services, youth groups, religious education, Sunday School, or other programs at a church, synagogue, mosque, or other religious institution?

- No time at all
- Less than 1 hour
- 1 - 2 hours
- 3 - 5 hours
- 6 - 10 hours
- 11 or more hours

35. During an average week, how many hours do you spend participating in extra-curricular school activities (sports, band, school clubs, etc.)?

- No time at all
- Less than 1 hour
- 1 - 2 hours
- 3 - 5 hours
- 6 - 10 hours
- 11 or more hours

36. How many service or volunteer projects have you participated in, where you volunteered for a service project but were not given any time to talk or write about what you did and what you learned from your experience? (Include total number of projects

through Scouts, your church/synagogue/mosque, or your school, but not any you may be involved in now).

- None
- 1
- 2
- 3
- 4 or more

37. During an average week how many hours do you spend working at a paid job?

- No time
- 1 - 5 hours
- 6 - 10 hours
- 11 -15 hours
- 16 - 20 hours
- 21 - 30+ hours

38. In the next five years, how likely is it that you will be actively involved in political issues or social causes that affect your community?

- Very likely
- Pretty likely
- Somewhat likely
- Not very likely
- Not at all likely

39. In the next five years, how likely is it that you will volunteer your time to help others who are having problems or are in need (such as food or clothing drives or working in a shelter)?

- Very likely
- Pretty likely
- Somewhat likely
- Not very likely
- Not at all likely

40. In the next five years, how likely is it that you will spend some of your time working on projects aimed at preserving and protecting the environment?

- Very likely

- Pretty likely
- Somewhat likely
- Not very likely
- Not at all likely

41. In the next five years, how likely is it that you will volunteer to do something like tutoring kids, visiting the elderly, being a mentor, or coaching a team?

- Very likely
- Pretty likely
- Somewhat likely
- Not very likely
- Not at all likely

42. In the next five years, how likely is it that you will find personal and intellectual satisfaction in volunteering your time to help others?

- Very likely
- Pretty likely
- Somewhat likely
- Not very likely
- Not at all likely

APPENDIX H

ORGANIZATIONAL CALENDAR

**Entomology Outreach & Service Learning
ENTO 3900
Organizational Calendar**

Week	Dates	Holidays	Journal	Class/Reflection	Notes and Reminders
1	1/10		1 st Day of Class	Syllabus Getting to Know You Orientation	Pre-Survey
2	1/17		#1 Due - See weekly written assignments	Entomology at a Glance Introduction to Insects & Their Relatives	
3	1/24		#2 Due - See weekly written assignments	What is Service-Learning? Community Partners	
4	1/31		#3 Due - See weekly written assignments	Insect Facts & Myths Mock Outreach	
5	2/7		#4 Due - See weekly written assignments	Service-Learning Projects PLC Outdoor Classroom	
6	2/14		#5 Due - See weekly written assignments	Grants and Granting Agencies	
7	2/21		NO JOURNAL	Classic City High School Partnership Mimi Middendorf & Elizabeth Duval	Create Insect Zoo Flyers
8	2/28		#6 Due - See weekly written assignments	One Minute Paper	Mail Insect Zoo Flyers
9	3/7	Southeastern Branch Meeting Entomological Society of America	NO JOURNAL	Tour Insect Natural History Museum Cecil Smith	
	3/12-3/16	SPRING BREAK	SPRING BREAK	SPRING BREAK	
10	3/21		#7 Due - See weekly written assignments	Discuss Service-Learning articles	
11	3/28		#8 Due - See weekly written assignments	Prepare for the Insect Zoo	3/30 Insect Zoo Mandatory Attendance
12	4/4		#9 Due - See weekly written assignments	One Good Thing/One Bad Thing	
13	4/11		#10 Due - See weekly written assignments	Discuss Critical Thinking	
14	4/18		#11 Due - See weekly written assignments	Discuss future Service-Learning Projects	
15	4/25		NO JOURNAL	Teacher Evaluations Loose Ends, etc.	Post Survey
	5/2	FINALS	Final Summary Reflection Due (Refer to guiding questions)		

****All topics are tentative. Student needs drive the reflection meetings. This list may change based on journal entries or student questions. ****

APPENDIX I

JOURNALS & WEEKLY WRITTEN ASSIGNMENTS

You are responsible for submitting journals and weekly written assignments according to the organizational calendar. Please include the journal number and your name on all submissions in order to receive full credit.

Journal Entry #1: Describe, using metaphors and similes, your favorite and least favorite teachers.

Journal Entry #2: What is service-learning? What are the critical components? Why is it important? List three examples of service-learning projects from three different disciplines.

Useful Service-Learning Websites

Campus Compact - <http://www.compact.org>

The National Service-Learning Clearinghouse - <http://www.servicelearning.org>

National Society for Experiential Education - www.nsee.org

Michigan Journal of Community Service Learning - <http://www.umich.edu/~mjcs/>

The University of Georgia Office of Service-Learning - <http://www.servicelearning.uga.edu/>

UC Berkeley SL & Civic Engagement - <http://gse.berkeley.edu/research/slrdc/resdirectory/#>

National Youth Leadership Council - <http://www.nylc.org/index.cfm>

Journal Entry #3: Use the web (or any other sources) to find interesting facts and myths about our Outreach Insects/Arthropods. Be prepared to pick your favorite and share with the class. Visit *Tree of Life Web Project* <http://tolweb.org/tree/phylogeny.html> and become familiar with Arthropod phylogeny.

Journal Entry #4: Visit UGA's Center for Leadership & Service website <http://www.uga.edu/cls/>, specifically the resource section for service, and list three organizations that interest you. Describe some potential service-learning projects linking these organizations and their needs with UGA students, classes, or departments.

Journal Entry #5: Visit Grants.gov <http://www.grants.gov/> and identify three grants that we qualify and could apply for. Describe each grant (agency, \$, deadline, etc.) and suggest potential service-learning projects.

Suggestions for search by category:

Teaching & learning, science education, service-learning, cooperative learning, experiential learning, higher education/community partnerships, participatory action research, etc.

Suggestions for search by agency:

DOE, USDA, NSF, NIH, National & Community Service, EPA, etc.

Journal Entry #6: Free Write – Various media ok (pictures, video, audio, poems, collages, etc.). Suggestions: Describe an outreach experience.

Journal Entry #7: Utilize UGA Libraries <http://www.libs.uga.edu/> and Galileo Databases or other familiar electronic journals to find and summarize two service-learning journal articles from two disciplines. Prepare a one page summary (max.) for each article.

When structuring your summary include these components: *Introduction and Background, Data/Participants/Methods, Findings/Results Section, Discussion/Conclusions Section.*

Be prepared to discuss your articles in class.

- Suggestions:
- 1) Do not limit yourself to “Science & Technology”
 - 2) Utilize several search engines and databases
 - 3) Narrow down your search

Journal Entry #8: Free Write – Various media ok (pictures, video, audio, poems, collages, etc.). Suggestions: Describe an outreach experience.

Journal Entry #9: Free Write – Various media ok (pictures, video, audio, poems, collages, etc.). Suggestions: Describe an outreach experience.

Journal Entry #10: What does it mean to be a critical thinker, writer, observer, citizen? Can critical thinking be learned? Explain. Give me examples of each and references to support your argument. Utilize primary and secondary references as well as websites.

Journal Entry #11: Suggest three service-learning projects for future Entomology Outreach & Service-Learning Courses and explain what would be needed to carry them out (community partners, funds, students, time, etc.).

APPENDIX J

ENTOMOLOGY OUTREACH & SERVICE-LEARNING SYLLABUS

ENTO 3900
Spring 2006

Marianne Robinette and Ray Noblet
706-542-1238 (phone) 706-542-2279 (fax)
entomolo@uga.edu

Credits: 1-3 hours
Schedule: Wednesdays, 11:15A-12:05P
Location: Room 426, Biological Sciences Building

COURSE DESCRIPTION

This course provides an overview of entomology outreach and service-learning. Students will participate in a guided study and practice in developing entomological educational programs for the public (mostly children) in the Athens/Atlanta area, which includes identifying needs, establishing objectives, and designing and evaluating entomological educational programs.

COURSE OBJECTIVES

This course is designed to facilitate a partnership between the community and the University of Georgia. Students enrolled in this course will spend significant time in local schools and community organizations hosting entomological programs. From this, the following goals are sought:

- Improve the science experiences and science content knowledge of community students in the UGA area through hands-on science programs.
- Increase awareness among community students about career opportunities related to agricultural and environmental sciences
- Provide experiences for students and teachers that will bring about more positive attitudes about science.
- Develop a sense of community involvement for UGA students that will continue after graduation
- Promote science knowledge in a positive way to the community students and teachers who work with the UGA students
- Enhance the communication and leadership skills of UGA students.

Your participation in this program is what will allow these goals to be met.

COURSE EXPECTATIONS AND REQUIREMENTS

Spending time at outreaches

Students must devote a minimum of 2 hours per credit hour enrolled each week to outreach and service-learning activities. This may include planning, preparing, commuting, and facilitating during the outreaches. This does not include class-time.

Please note you are expected to have 10 contact outreach hours per credit hour enrolled over 13 weeks. This is roughly 1-3 hours a week.

- 1 CR – 10 hours
- 2 CR – 20 hours
- 3 CR – 30 hours

Reflection Groups

Each class will begin with a student report of the previous week’s outreach activities. During these meetings, students will receive help with ideas, discuss experiences, and support each other.

Journal Entries

Students submit journal entries according to the schedule provided (roughly one/week). It is expected to be thoughtful and reflective. There will be questions assigned to guide your first journal entry and your summary reflection. Journals can be in any media (pictures, video, audio, poems, collages, etc.).

Service-Learning Project

Each student will participate in a service-learning project with our community partner Classic City High School. The specific project will be decided and implemented by the students with guidance from the instructors.

GRADING

1. Attend and participate in class.
2. Facilitate outreaches in the community as stated in the expectations and requirements.
3. Make a presentation about entomology outreach programs to a UGA student group.
4. Submit 10 of possible eleven reflective journals.
5. Submit reflective summary of experience.
6. Submit service-learning grant proposal.

GRADE APPORTIONMENT

Reflective Journals	20pts
Summary Reflection	20pts
UGA Club Presentation	10pts
Outreach Hours	20pts
Service-Learning Project	20pts
Overall Professionalism and Participation	<u>10pts</u>
Total	100pts

ASSIGNMENTS

You are responsible for submitting a Reflective Journal Entry according to the organizational calendar. These entries must be turned in at the beginning of class. Please include the journal number on all submissions. Additionally, you will submit on Summary of Experience at the end of the semester. Guiding questions will be provided to help you structure the final summary. As a part of the service-learning project each student will also submit a grant proposal.

APPENDIX K

FINAL REFLECTIVE SUMMARY

Please refer to the following questions. There are no "right" answers, please be honest and thorough (use examples, etc).

1. Reflecting on your experience with Entomology Outreach & Service-Learning, please describe what you feel you have learned about society.
2. Reflecting on your experience with Entomology Outreach & Service-Learning, please describe what you feel you have learned about the processes of learning and teaching--you can refer to your own learning or the communities' learning.
3. Did you learn any science content in this experience? This could be something you had never learned before this experience, or something you feel you understand better because you taught it.
4. Suggest some service-learning projects for future Entomology Outreach & Service-Learning Courses and explain what would be needed to carry them out (community partners, funds, students, time, etc.).
5. Describe any other effect participation in Entomology Outreach & Service-Learning, has had on you as an individual. In other words, will you do or think about things differently because of this experience?

APPENDIX L

UNDERGRADUATE OUTREACH SURVEY

1. What is your name?

2. What is your age?

- 18-22 23-27 28-32 33-37 38-42

3. Where are you from? (City, State, Country)

4. What is your major and your college?

5. Why did you begin helping with UGA Entomology outreaches?

6. How many outreaches have you participated in with UGA Entomology?

- 1-10 11-20 21-30 31-40 41-50 >50 >75 >100

7. Please describe an outreach in detail. Include insects shown, any special activities, etc.

8. What were the reactions of those involved with the outreaches? Please include any direct quotes, especially from those benefiting from the outreach.

9. Which type of outreach did you find to be the most personally rewarding and why (Guest lecturer vs. display booths, elementary vs. older audiences, schools vs. community events, etc.)?

10. What long-term/lasting impacts do you believe these entomology outreaches have on local and university communities?

11. Will you continue to do outreaches or other community service in the future?

- Yes No Maybe

12. What are your career plans after you graduate?

13. Will the lessons and experiences you gained through the Entomology Department's outreaches have any relevance or influence towards the next stage of your life?

14. Is there a specific direction you would like to see future outreaches through the Entomology Department take, such as targeting a specific sector of the community?

15. Would you be willing to participate in a follow-up interview?

- Yes No

APPENDIX M

GRADUATE OUTREACH SURVEY

1. What is your name?

2. What is your age?

- 18-22 23-27 28-32 33-37 38-42

3. Where are you from? (City, State, Country)

4. What is your specific area of research?

5. Why did you begin helping with UGA Entomology outreaches?

6. How many outreaches have you participated in with UGA Entomology?

- 1-10 11-20 21-30 31-40 41-50 >50 >75 >100

7. Please describe an outreach in detail. Include insects shown, any special activities, etc.

8. What were the reactions of those involved with the outreaches? Please include any direct quotes, especially from those benefiting from the outreach.

9. Which type of outreach did you find to be the most personally rewarding and why (Guest lecturer vs. display booths, elementary vs. older audiences, schools vs. community events, etc.)?

10. What long-term/lasting impacts do you believe these entomology outreaches have on local and university communities?

11. Will you continue to do outreaches or other community service in the future?

Yes No Maybe

12. What are your career plans after you finish your program of study?

13. Will the lessons and experiences you gained through the Entomology Department's outreaches have any relevance or influence towards the next stage of your life?

14. Is there a specific direction you would like to see future outreaches through the Entomology Department take, such as targeting a specific sector of the community?

15. Would you be willing to participate in a follow-up interview?

Yes No

APPENDIX N

COMMUNITY OUTREACH SURVEY

1. What is your name?

2. What is the name of the organization you are with (school, community group, nature center, etc.)?

3. What is your organization's address?

4. What age group does your organization serve?

- Elementary school
- All ages
- College students
- Seniors
- Middle school
- High school

5. Why did you request a UGA Entomology outreach?

6. How many outreaches has UGA Entomology done with your organization?

- 1
- 2
- 3
- 4
- 5
- >6

7. Please describe the outreach in detail. Include insects shown, any special activities, etc.

8. What were the reactions of those involved with the outreaches? Please include any direct quotes, especially from those benefiting from the outreach.

9. What long-term/lasting impacts do you believe these entomology outreaches have on communities?

10. Will you continue to request Entomology outreaches in the future?

- Yes No Maybe

11. What lessons and experiences do you feel your students or the community gained through the Entomology Department's outreaches?

12. Is there a specific direction you would like to see future outreaches through the Entomology Department take, such as targeting a specific sector of the community?

13. Would you be willing to participate in a follow-up interview?

- Yes No

APPENDIX O

SEGUE MINI-GRANT FUNDING REQUEST

1-2 page proposal

1. A description of the proposed service-learning project and activities (please include the purpose of the project, the service and learning goals and activities, how service and learning goals and activities are aligned with PLC critical need areas above and the expected service-learning project outcomes)
2. A brief description of your service-learning project timeline and plan for sustaining the project
3. A short list of the evaluation criteria that will be used to assess the quality of the service-learning project

APPENDIX P

THE BASIC STRUCTURE OF A GRANT

Regardless of type, all grant applications have a similar structure. This lesson provides an overview of that structure, taking you through the seven narrative components of a typical grant: Abstract; Statement of Need; Project Description; Goals & Objectives; Activities & Timeline; Evaluation; Organizational Capacity.

The Abstract

This lesson is an in-depth review of the Abstract section of a grant. Learn the best way to manage this small-but-mighty section of your application.

Statement of Need

It's the most pivotal part of any grant application. Discover how to write a compelling "problem statement" that both draws the grant-maker's interest and makes your program response seem like a natural solution.

Project Description

The longest and most involved section of any application is the description of your proposed project. Three separate lessons break this section down into manageable units. Identifying your agency, its partners, the target population to be served, and the qualifications of the Project Coordinator and other staff. Explaining your methods (how the program will operate), providing a rationale for choosing such methods, and stating the research or evidence justifying your choices. The importance of addressing cultural issues, the potential for "institutionalizing" your program; leveraging other available resources; when and how to use a Memorandum of Understanding.

Goals & Objectives

Every grant-funded program must aim for a specific goal. This lesson demonstrates how to set a goal that's do-able as well as how to write objectives [strategies to achieve the goal] in terms that are simple, clear, and measurable.

Activities & Timeline

A typical grant-maker provides funding for one year of program operation and wants to know exactly how you plan to achieve your goal within that timeframe. Learn how to create an Activities & Timeline chart -a "punch list" of specific steps needed to achieve each objective.

Evaluation

Evaluation is the collection of evidence that proves your program had some kind of impact or created change. Learn about the two ways to evaluate most programs: process evaluation and outcome evaluation.

Budget

Grant funds support the cost of delivering your program or service. Learn how to structure a budget that's acceptable to the funder, the difference between a budget narrative and a budget summary, and what you need to know about budgets after a grant award has been made.

APPENDIX Q

CLASSIC CITY APIARY PROPOSAL SEGUE MINI-GRANT

Objective: To establish an Apiary (bee colony) at the Classic City High School Performance Learning Center

Description of the project:

In collaboration with the University of Georgia, Department of Entomology, the Classic City High School Performance Learning Center (PLC) proposes to develop a functional working Apiary on the grounds of the PLC. This project will be used as a learning tool for both institutions in the field of biology and other sciences as well as for business, economics and entrepreneurship classes. Production of honey will also be collected and sold to the community to help fund the project and provide income in order to help fund other school projects and to sustain the colonies. This proposal contains the basic information needed for an Apiary.

Bees are the only source to honey and bees wax and can help cross pollinate many different flowers, vegetables, and berries. The bees will be an attraction to many people and especially those interested in science. Many classes could benefit from having an apiary. Biology and Entomology classes could study the behaviors of the bees. Economic and business entrepreneur classes could run the selling of honey for school fund raising. Overall the Apiary Project between Classic City High and the University of Georgia Department of Entomology will not only be beneficial for students and teachers as a learning resource tool, but also for the community at large for learning and enjoying one of nature's finest sweeteners.

Site Proposal for an Apiary must include the following:

- discrete area (not a lot of heavy traffic)
- sheltered/partially shaded
- high land area (less moisture) - avoid low places
- near water source (creek nearby)
- future site is a courtyard surrounded by a fence between two buildings
- honeybees can be kept near flowering plants that produce nectar
- bee flight paths must not pass sidewalks, playgrounds, or public areas.

The back yard at the Classic City High School Performing Learning Center is the proposed spot for the Apiary. The location we decided would be best is on the PLC side of the fenced in area. It would be placed close to the radio tower due to its relative seclusion from the rest of the grounds. This area also gets adequate sunlight. This area we are looking at has a clear spot and is away from the walk ways.

Expected outcome:

A colony can be expected to produce 40 to 50 lbs. of honey, having 5 colonies at the PLC will generate anywhere from 200-250 lbs. of honey in a successful season. When bottled and sold in 16 ounce jars at a price of \$5/jar, profits can range anywhere from \$1000-\$1250. Therefore, in two years time you have covered all of the initial expenses of setting up the Apiary. After

equipment is bought and project is up and running, very little additional costs are required. In a few years time, not only will Classic City High have a functioning apiary but will also see a margin of profit through sales of the honey produced. Additionally the honey comb and wax can also be sold for further profit.

By being at the school the bees will be a learning experience. The bees will not only help the science classes like entomology or even biology. It will also help economics classes to come up with a market system to help sell the honey that is provided. It will also help in the fact that many people are scared of bees and they can overcome their fears by being around them more and learning that they are more useful than they are harmful. People will also be able to learn about them being social insects and the ways of their lifestyles.

Start-up and Materials:

The best Method to start the apiary is to purchase an established colony with the equipment required from a local beekeeper. It is best to set up a colony early in the spring when water and flowering plants are abundant.

-"Bee Ginners Kit" found at www.brushymountainbeefarm.com

Basic beginner's kit starts at \$125 per hive, but does not include all equipment necessary. Total equipment comes to around \$250 for everything needed, therefore for 5 colonies it would cost about \$1250. Used equipment can also be purchased for a cheaper price and some supplies will be donated from local bee keepers and the UGA Entomology Department to offset costs.

Budget:

This \$400 seed grant would be matched with funds from the UGA Entomology Department. All of the funds from this grant will go towards supplies and materials for establishing the bee colonies.

People Involved:

Kevin Jones – Student, Classic City High

Danielle Smith – Student, Classic City High

Elizabeth Glenn - Entomology teacher, Classic City High

Marianne Robinette – Program Coordinator, UGA Entomology

Undergraduate students in ENTO 3900 – Entomology Outreach and Service-Learning

(Ashley Boylan, Josh Gropper, Brad Held, Jean Matthew, Mike Maudsley, and Paul Meade)

Sustainability:

Future classes at the Classic City High School as well as future UGA students, faculty and staff will maintain the apiary as well as promoting and selling the honey through business, economics and entrepreneurship courses.

Evaluation Criteria:

The evaluation criteria will be based on current evaluation literature in service-learning.

APPENDIX R

OUTDOOR CLASSROOM BRAINSTORMING SESSION

Context

- Partnerships
- Community
- Education
- Success
- Friends
- Opportunity
- Progression
- Unique
- Forward
- Multi-purpose
- Gated
- Fenced
- Spare
- Institutional
- Lively
- Dual
- Creative
- Technology
- Escape
- Potential
- Possibilities
- Enclosed
- Open
- Friendly
- Unfriendly

Do Not want

- Straight lines/English Gardens
- Fluidity vs rigidity
- Cross road ties
- Fence
- Radio tower

Recreation

- Tennis
- Baseball
- Ropes Course
- Basketball
- Volleyball
- Bocce Ball

Concept

- Make it exciting
- Creative learning environment
- Peaceful and educational
- Recreation activities
- Cultural
- Diversity
- Comfortable
- Exotic
- Water
- Edible
- Environmentally Friendly
- Zen
- Colorful visually pleasing
- Perennial
- Seasonal
- Art in the landscape
- Nomenclature/identification
- Hands-on
- Natural and flow in the environment
- Cross communication
- Sound
- Chimes
- Amphitheater/stage/seating
- Shade
- Composting
- Fragrance
- Fountain
- Recycle
- Bird houses

Plants

- Unpruned
- Self-maintained
- Native varieties

APPENDIX S

Insect Natural History in Costa Rica, ENTO 3140-3140L Maymester 2006 (May 16 – June 5, 2006)

General Course Information:

In terms of the number of described species, insects are easily the largest and most diverse group of animals, and that diversity is most conspicuous in tropical latitudes where most of the centers of insect biodiversity lie. Unfortunately, students rarely have an opportunity to experience the fauna and flora of the tropics first-hand under the instruction of a knowledgeable guide and instructor. This course designed as an interdisciplinary course involving the study of insects and discussion of their natural history in tropical terrestrial and aquatic ecosystems, combining intense lectures and field/lab work in Athens with direct field experience in Costa Rica.

Instructors:

Floyd Shockley, fshockley@bugs.ent.uga.edu , 706-542-6187, 461A Biosciences
Marianne Robinette, entomolo@uga.edu , 706-542-1238, 413 Biosciences
Darold Batzer, dbatzer@uga.edu , 706-542-2301, 409A Biosciences

Facilities Visited by the Course (Estimated Dates):

Athens, GA – 426 Biological Sciences Building (May 16 – 22)
San Luis, CR – UGA’s Ecolodge San Luis & Research Station (May 23 – May 31)
Puerto Viejo, CR – OTS La Selva Biological Station, Heredia (June 1 – 4)

Attendance:

Because of the intense nature of the sessions, attendance and punctuality are mandatory as is participation during in-class lectures, field trips, and lab exercises, without exception. While in Athens, we will meet from 9:00 – 12:00 and 1:00 – 4:00 Tuesday – Friday. While in Costa Rica, class will meet every day (including weekends) for longer hours (~12 hours/day). Evenings will usually be open for students as free time or to work on their reports.

Grading:

Student grades will be based on each student’s preparation of a properly-mounted, labeled, and identified collection of tropical insects, entirely identified to the family-level. In addition, they will be judged based on their ability to communicate knowledge of tropical insect natural history and behavior in oral and written reports of their faculty field problems (3 in total), which will be submitted periodically during the field component of the course.

Insect Collection	15 orders / 50 families	450 pts.
Field Problem Pres.	50 pts	50 pts.
Faculty Field Problem Write-ups	50 pts / each x 4	<u>200 pts.</u>
TOTAL		700 pts.

APPENDIX T

Insect Natural History in Costa Rica ENTO 3140-3140L 1st Summer Session (June 7 – July 3, 2007)

General Course Information:

In terms of the number of described species, insects are easily the largest and most diverse group of animals, and that diversity is most conspicuous in tropical latitudes where most of the centers of insect biodiversity lie. Unfortunately, students rarely have an opportunity to experience the fauna and flora of the tropics first-hand under the instruction of a knowledgeable guide and instructor. This course designed as an interdisciplinary course involving the study of insects and discussion of their natural history in tropical terrestrial and aquatic ecosystems, combining intense lectures and field/lab work in Athens with direct field experience in Costa Rica.

This course also provides an overview of entomology outreach and service-learning. Students will participate in a guided study and practice in entomological educational programs for children in the Athens area and in San Luis Community Schools.

Instructors:

Darold Batzer, dbatzer@uga.edu , Tel: 706-542-2301, 409A BioScience
Marianne Robinette, entomolo@uga.edu , Tel: 706-542-1238, 413 BioScience

Teaching Assistant:

Nathan Lord, nlord@uga.edu, Tel : 706-542-6187, 461 BioScience

COURSE EXPECTATIONS AND REQUIREMENTS

Field Projects

Students will conduct individual field research projects during the course based on comparative studies of replicated projects in Athens and in Costa Rica. Students will be graded on their ability to follow the scientific method and communicate knowledge of insect natural history in a written report and a brief oral presentation.

Insect Identification and Collections

Students will be expected to learn how to identify insect orders and families. Each student will also be responsible for building a beetle collection at the UGA Costa Rica campus in San Luis consisting of 15 families of properly-mounted, labeled, and identified insects. The Primary Beetle Collection will remain in Costa Rica at the Ecolodge where it will be used primarily for teaching and as part of a representative reference collection which visitors to the area might see. Unusual or unique specimens or species, as well as a representative collection will be given to INBio in San Jose.

Outreach & Service

Students are expected to participate in entomology outreach and service in San Luis Community Schools and community outreach programs in Athens.

Reflection & Field Journals

Students will be provided with field journals that they are expected to utilize as a lab book to document your research. Journals may also be reflective in nature.

Attendance:

Because of the intense nature of the sessions, attendance and punctuality are mandatory as is participation during in-class lectures, field trips, and lab exercises, without exception. While in Athens, we will meet from 10:30am - 12:00pm and 1:00pm – 3:00pm. While in Costa Rica, class will meet every day (including weekends) for most of the day, and some evenings. However, most evenings will be open for students as free time, to work on their reports or for night collecting.

Grading:

Order Site ID Quiz	10 pts
Field Project Methods Report	10 pts
Beetle Collection/15 families	20 pts
Field Project Presentation	5 pts
Field Project Final Report	40 pts
Outreach & Service	10 pts
Field and Reflective Journals	5 pts
TOTAL	100 PTS

Facilities Visited by the Course (Estimated Dates):

Athens, GA – 426 Biological Sciences Building (June 7 - June 18)

San Jose, CR – Travel to Costa Rica, Alajuela (June 19)

Puerto Viejo, CR – Organization for Tropical Studies, La Selva Biological Station, Heredia (June 20 – June 24)

San Luis, CR – UGA’s Ecolodge San Luis & Research Station, Travel to US (June 24 – July 3)

APPENDIX U

Insect Natural History in Costa Rica ENTO 3140-3140L 1st Summer Session (June 5 – June 30, 2008)

General Course Information:

Insects are the largest and most diverse group of animals, and their diversity is especially high in the tropics. This course is designed to provide students with the opportunity to experience the insect fauna and other biota of the tropics first-hand. The course will include field studies of insects and lectures and discussions of insect natural history in terrestrial and aquatic ecosystems of tropical Costa Rica. The course also provides an overview of entomology outreach and service-learning, and students will participate in a guided study and practice in entomological educational programs for children in Athens and Costa Rica.

Instructors:

Darold Batzer, dbatzer@uga.edu , Tel: 706-542-2301, 409A BioScience
Marianne Robinette, entomolo@uga.edu , Tel: 706-542-1238, 413 BioScience

COURSE EXPECTATIONS AND REQUIREMENTS

Field Projects

Students will conduct two field research projects, primarily in Costa Rica. Students will be graded on their ability to follow the scientific method and communicate knowledge of insect natural history in written reports.

Insect Collecting and Identification

Students will be expected to learn how to identify insect orders and families. Each student will also be responsible for building an insect collection at the UGA Costa Rica campus in San Luis by collecting, properly mounting, labeling, and identifying insects.

Outreach & Service

Students are expected to participate in entomology outreach and service in Cost Rica.

Field Journal

Students will be provided with field journals and expected to use the lab book to document your research and collecting activities. Journals may also include materials reflective in nature.

Grading:

Order Site ID Quiz (Athens)	5 pts
Field Project 1 (Insects in Georgia vs. Costa Rica)	20 pts
Field Project 2 (Insect portion of Bird/Insect study in Costa Rica)	15 pts
Insect Collection Identification (1.0 pts per Order, 0.5 pts per Family)	40 pts
Insect Collection Quality	5 pts
Outreach & Service	10 pts
Field and Reflective Journals	5 pts
TOTAL	100 PTS

APPENDIX V

Spring 2006 - One Minute Paper

Although I want to be a part of an outreach, I feel like my knowledge in Entomology and handling of the insects as well as info about them is rather poor. How can I change that?

Are we supposed to be adding our volunteer hours up and I think it will be hard to get the 3 hours a week.

I enjoy the class because of the variety of things to do.

One good thing I have done this semester is join service learning.

This class has a lot to offer:

- Service learning
- Community base education programs
- Overall "feel-good" that you are doing your part.

This class to me has been quite an experience. I took place in an outreach at Monroe Elementary, where I enjoyed the interaction with children.

Signing up for this class was a wonderful idea. I enjoy the way the class is structured.

APPENDIX W

Spring 2007- One Minute Paper

I am glad Classic City Student are at least interested in the project. Even if they are not sure if they will like it or what it is about.

I have enjoyed my outreaches and am wondering when we can do more for the outdoor classroom.

I just hope Raynor and I don't procrastinate on the Outreach magazine until the end of the semester.

I have really enjoyed this service-learning class thus far. I feel that our service-learning efforts are an incredibly valuable asset for the Athens community. I wish more major classes did service-learning in order to help the greater good of Athens.

When are we going to start doing work at the PLC?

What makes a good Entomology student according to Marianne?

I would like to involve parents & children together at more events. Working with children at schools is great, but the parent child interaction is amazing to observe. The children are so much more brave.

I would like to see more outreaches on Saturday and in the evenings. With my work schedule and class schedule I can't get to most of the events. Evenings are best for me.

I just want to take time to appreciate the service-learning class that I am taking this semester.

Ants in my pants
Earwigs in my ear
Who stared all of these crazy sayings?

Fear of bugs
No fear if there is knowledge
Education is a powerful tool
Be careful how you use it.

Today I don't feel so well. I had a test, it was hard as hell. I'll be so glad to be done with today. Go home and take a nap, hooray!

I'm still waiting & my only concern with the outdoor classroom is the soil. It is horrible red clay, doesn'twith some...and the bees and the students

I really enjoy telling others about all the neat things we do with entomology outreach and seeing people get excited about what we are doing. I feel like we are really expanding our nature and getting more knowledge out there.

Insects at outreaches should be organized in some sort of order
Millepedes – Arachnids – Insects etc.

I have too much stuff on my plate and it is driving me crazy. How is it that everything comes at one time? I need more time for myself. Why! Why! Why!

After participating in some outreaches, I actually feel like I am affecting change for the better. I think we actually ARE educating.

APPENDIX X

Spring 2008- One Minute Paper

I am concerned that service-learning is a dying breed. Throughout the ages, humans have become progressively lazy. Do you expect us to perform services?

Service-learning is a great way to teach young and old about new and interesting subjects. I have learned and seen the various ways in which service-learning can be applied.

I think that service-learning is the approach to learning in the future. It is not truly helpful to be completely selfless in a project or to be selfish. Help others and yourself.

Before taking this class I had no idea what service-learning was. Now I have a pretty clear understanding due to the research & projects this class has provided for me.

Service-learning is something I did not know much about before taking this class, but I'm pretty sure I've engaged myself in an activity like this before.

My stomach hurts. Why does my stomach hurt? I guess service-learning is progressing.

I think service-learning gives people enlightenment to the community & new environments. It's a mutual growth.

Service-learning is progressive because it makes students want to learn so they don't seem ignorant when presenting information to a large class. They want to seem prepared and educated.

I think that service-learning is a very interesting and relevant concept that I have started to really like in the past couple of weeks. I am looking forward to continue participating in upcoming outreaches.

Service-learning has provided many with the ability to understand life as a whole and gives both the teachers and the learners the ability to help each other.

Service-learning is progressing more and more each day. States are now including after school programs that are designed to get kids involved in service-learning. Also schools are starting to come up with more and more service-learning ideas daily, & incorporating them in their schedules.

APPENDIX Y

Spring 2006 - One Good Thing & One Bad Thing

One good thing was teaching kids and adults about insects. One bad thing was at the insect zoo, Josh and I thought there was fire ants on the board but it was termites and we told people the wrong thing.

Good thing: We have educated many people at each outreach.

Bad thing: Sore thumbs at the bee lab

One good thing - Getting funded to do the Apiary

One bad thing - having to say NO to outreach requests

Good thing: Kids are very responsive and enjoy learning about insects

Bad thing: Few communication break downs when trying to organize departure to outreaches

Good: Kids in general @ bug zoo and how much they took from it

Bad: Not using the right kind of tape on a few signs for the bug juice (keep falling) and the taste of the bug zoo

Good Thing: I really appreciate the opportunity to actually be a hands-on worker for an apiary and know that it's going to be put to good use.

Bad Thing: When I told a group that the video was of fire ants, and two seconds later a Grad student tells them its termites after they already questioned my activity. Also, driving out to Stone Mountain in the rain on a Saturday morning for no visitors to show up.

Good Thing: When I took part w/ Paul in the Career Fair and they had free B.B.Q. Sandwiches and free drinks.

Bad Thing: The mishap w/ the mosquitoes at the insect zoo. When the little girl asked "what is this?" then proceeded to punch the feeding tube into the container allowing mosquitoes to escape.

One good thing about this class was the interaction with young children. Getting the children excited about science and enjoy.

One bad thing about this class was not being able to do as many outreaches as I wanted.

APPENDIX Z

Spring 2007 - One Good Thing One Bad Thing

Good: One good thing about doing outreaches is having Glen along to control the kids or impress an older audience with his vast knowledge of insects.

Bad: Not having Glen along to control the kids or impress the audience

Good: Getting to meet and hangout with Ruud. It's not every day that you get to kick it with someone famous for a day. He also was very educational in his speech to our class about how to get yourself out there in the lime light so to speak.

Bad: Not enough sleep; hence why I am always late to class or tardy with assignments.

Good: Learning & becoming more aware

Bad: Not certain schedules for things so always have to squeeze it in somehow

Good: I've learned much about insects which I have been surrounded my entire life, but was largely ignorant. Now I am less afraid of them.

Bad: I have extremely small roaches in my apartment, and thanks to the entomology department, I know this is a serious problem.

Good: The insects are now in the Biology building, My haikus

Bad: My haikus didn't win the art competition, We haven't worked on the IPM stuff in a while

Good: We're really helping the community and opening their eyes to entomology.

Bad: We don't have enough specific time slots for big outreaches so that lots of people can attend them. Maybe add more time slots on OASIS with the next class.

Good: Knowing that you are teaching someone something they didn't already know and seeing them being affected by our outreaches.

Bad: Having to write these papers! And have to see Sam every Wednesday.

Good: I think that it is wonderful that this class even exists. Sharing live insects with children is something that I wish I had the opportunity to experience when I was younger.

Bad: I feel that many of our displays could use some work. Many of our aquariums are cracked or very dirty/old. It sets some bad light on the insects before people even see them.

Good: I have learned many more facts about insects in general. Also, I may watch Ruud on The Discovery Channel from now on.

Bad: The paper a week – only because I'm pressed for time & creativity due to my 2 jobs & anatomy course. That is my personal flaw.

APPENDIX A1

Spring 2008 - One Good Thing One Bad Thing

Good: Thinking up all these ideas for outreach, insect zoo, etc. is fun, exciting, & motivating.

Bad: It's not as easy as you think to actually make it happen.

Good: I like to see the excitement that is in the faces of some of the children who see our bugs. It revitalizes my own excitement.

Bad: Think the mothball smell in 426 is getting to me after spending many days here.

Good: Excited about the Insect Zoo and all the kids

Bad: Andrea

Good: I really enjoyed this class and being about to help with the insect zoo and plan events.

Bad: I won't be going to Costa Rica this summer. It will be in exchange for another good thing, but still.

Good: I finally got a job for this summer lined up, so my mom is finally off my case.

Bad: I was absolutely saddened and shocked when I heard about Andrea's death. It really puts things in perspective when someone who I did not know well, but overwhelms me with her presence in class could pass away so suddenly. My heart goes out to her family and friends.

Good: Public knowledge about insects is increasing at each outreach we attend. As the knowledge base grows so does respect for insects and overall concern about things crawling beneath our feet.

Bad: We should extend our outreach to other areas other than Athens. I feel that this area is very well covered.

Good: My new puppy and job!

Bad: I don't know where I am going to live next year.

Good: The insect zoo looks to be shaping up nicely and I think everyone knows their roles in order for it to be successful.

Bad: Even though there is a honeybee shortage, my allergies are acting up due to the pollen in the air. That sucks!

Good: I am very excited about spending entomology money at Lowes for the insect zoo.

Bad: I am very hungry for a meal, but I don't have a break before my next class.

Good: I really enjoy coming to this class and don't skip it and enjoy the material.

Bad: The opposite is true of my major classes. Finance is hard!

Good: Entomology is awesome. (Especially the insect zoo)

Bad: There is a bumble bee in the bathroom of our house.

APPENDIX A2

FOCUS GROUP GUIDE

- 1) Can you share some of your general thoughts on your experiences with this service-learning project?

Probe(s): Were there particular events or experiences that stand out? What aspects of the project did you like and what areas did you dislike? Is there anything in particular that you would like to say about your experience with this project?
- 2) How did you feel about doing this work as part of your schoolwork?

Probe(s): How did it enhance and/or hinder your learning?
- 3) Can you comment on the relationship with UGA students?

Probes(s): How did it change your perspective of UGA students and/or on attending college or a university? In what ways did the students support your project work?
- 4) How was the relationship with your instructors at the PLC?

Probe(s): In what ways did they provide support for your project work?

What went well? What are areas that could be improved?
- 5) Has your participation in the project changed the way you see yourself or your interaction with others?

Probe(s): For example, some students mention a greater sense of confidence or ability to talk with other students.
- 6) In what ways has participation in service-learning affected your future goals and career aspirations?

Probe(s): For examples, some students decide that they would like to pursue a specific career or discipline that relates to their service-learning experience.
- 7) Overall, what suggestions do you have for improving the quality of the PLC-UGA service-learning project?

Probe(s): For example, how was your service-learning project placement?

How was the workload? What aspects of the program helped you complete the service-learning project?

APPENDIX A3

CLASSIC CITY FOCUS GROUP WITH TEACHERS

In classroom projects – opportunities at UGA

Service-Learning Internships

More liaisons with other sciences – Agreements with UGA, genetics, food science, etc., Students exposed to labs, experiments vs. “bucket chemistry”

Long-term Partnership

Resource Guide @ Service-Learning

Before, During & After

What you do on-site to improve the learning

Relationship and planning

Pedagogy

- 1) Clear collaboration in advance – What the goals, products, individual responsibilities, PLC and UGA students at both sites
- 2) Define formal opportunities for interaction
- 3) Implementation – refer back to Guidelines
Facilitating Action – Captain or point person – Web-based options, webCT, message board, schedule, sign-up, difficult to identify general needs
- 4) Organizationally identify needs
Don't want to force Service-Learning
Interested at PLC and UGA Departments
Don't want to be pushed in certain direction
Greater participation around what they care about

Engage UGA and PLC – engage students

Brainstorming fun – real work tougher – shy to make appointments

Individuals involved are different, making it meaningful for the student

Outcomes of Service-Learning: Learning Life Skills, organizational skills, etc.

- Indicators, templates, what SL can contribute, discipline, social, confidence (PLC students Proposal to superintendent of schools for an apiary, didn't use “ah”)
- Observables that you can tie into their grade
- Quantifying the qualitative
- Reflection – Tools, prompts, oral reflections, empowered to evaluate
- Symposium
- Resources

Facilitation – meet before and after, 3rd party present to introduce new/different ideas

Involvement with Career Center at UGA is a possibility

Key Component – Sustainability of projects

Trade off – some time on campus and some time at the PLC

Opportunity for professional development

Procedural/Logistics – Year round, summer

1st semester – plan experience

2nd semester – SL Active

Connecting classes w/ students

Partnership with education

Getting ready for graduation

Take advantage of placing

Transportation issues

Need connections w/ Athens Tech

Kinds of project they could do – full semester

Community-based research project – students participate

School district says... “internal and external influences

Practitioner & researcher experiences – extra protocol for H.S. students (understanding motives)

Pre-interviews

More pre-planning in all programs- Talk sooner

APPENDIX A4

CLASSIC CITY FOCUS GROUP WITH STUDENTS

Service-Learning Projects:

Political Science – Course at the PLC and at UGA, not a lot of interaction between two groups of students Fall Semester. Spring semester follow-up projects a bit better communication

Entomology – Course at the PLC Fall Semester, 2 PLC students doing career-based service-learning at UGA with an Entomology class Spring Semester

Business – Jittery Joes – UGA students primarily Fall – Spring PLC students operating Experiences w/ SL projects: problem with coordination for UGA & PLC in some cases

- 20 minutes of collaborative work total, met twice - during class time once (Political Science students). No constructive work going on – over in 5 or 10 minutes, not really collaborative or getting input from PLC students

Possibilities for future SL projects:

- must set a time,
- on-line messaging forum, etc.
- schedule meeting times – not volunteer, cross scheduling between UGA and PLC

Curriculum around SL – what did you learn?

- internships – jobs
- Jittery Joes – job skills, training, free food, a spot in school that is something new, hands on learning,

Entomology – not something people normally do, interesting, interest in forensics as a career, may help shape that decision, definitely be able to tell if that's what you want to do

Work with instructors – How?

- It is different working hands-on
- Teacher 'regular class' unattended

Interest in the sciences – how to find out opportunities for students, College prep day, opportunities for working with students at the PLC (learning but enjoying), more hands-on

Service not necessarily related to academics – working with people

Overall suggestions about projects with UGA

- 1) Involve students – broader range of possibilities, pre-SL input, choices about different projects, connected with UGA uncertainty because of new program, on site, working out well with instructors, opportunities for hiring, incentives to stay,
- 2) UGA project, not a PLC project - coordination - Bigger involvement by PLC students

APPENDIX A5

SPRING 2006 FINAL REFLECTIONS

Society

“There are several things I noticed about society in regards to this class. First off, people in general are scared of what they don’t know... ..I think courses like this are definitely beneficial to people of all ages. Secondly, there are a lot of misconceptions that are spread around about insects and arachnids... ..Thirdly, I was reminded of how inquisitive kids are on several of the outreaches I worked... .. They seem to yearn so much for knowledge.

“As far as the rest of society goes, I feel I have learned many things, including the fact that the education of a child is almost entirely dependent on their parents (this also comes from my tutoring experience)... ..This is really the thing I love about our outreaches that involve parents and their children; we are providing a perfect environment for our community of parents and children to come and have an educational experience together. It is an easy way for parents to foster an environment of education in their household, showing their kids that they themselves are interested in learning, while showing that learning can be fun and interesting”.

Teaching and Learning

“...I have learned that you don’t always need others to be at an outreach with you. As long as you are confident about what you are teaching you can and will be able to accomplish the task at hand. This class gave me a sense of direction and it fulfilled my need to talk constantly. I hope that the department will continue to offer this class because I have never experienced a class like this one”.

“It was funny to watch how kids take power in their knowledge... ..when you teach a child something interesting about an insect that isn’t known by most people, it becomes a personal vendetta for them to tell everyone they know. This furthers my belief that teaching children at a young age can be very beneficial, not only for them but also for their peers. It seems that in general society seems to lose that enthusiasm for learning and spreading that knowledge to others as we get older. When you are young everything you learn seems like a new found treasure”.

“This class allowed a more direct and “hands-on” opportunity not only to teach, but also to learn from other s about diverse topics dealing with the study of insects and invertebrates, as well as topics within the broader context of biological sciences. Through community involvement I fielded more questions than I ever thought I would about insects and other arthropods which taught me a great deal about effective communication with non-scientists about scientific subjects. Also, I was able to learn about arthropod rearing, maintenance and presentation which provided valuable experience and allowed me to be more knowledgeable and effective at taking what I have learned and applying that knowledge in real world situations and sharing it with others”.

Science

“The biggest impact this class had on me is the huge need for outreach from the scientific community... ..regardless of whether or not we really change the way they think about insects, they have been introduced to it, and maybe see insects in a different light, or at least have been exposed to the idea that insects are useful and not so scary. And this is something that is needed in every aspect of science; a chance for the community to get education on a subject from a reliable source that can answer their questions and explain things... ..I feel that outreaches are an incredibly powerful tool for the scientific community and that I will be involved with outreaches of some kind for the rest of my life”.

“I have learned that learning is a dynamic process, especially for younger children, and one that is rarely affected by sitting and listening. Facts can be very boring, but placed within a context of evolutionary fitness they become imbibed with life that invokes understanding and lasting recollection. For example, telling a kid that a scorpion with large pedipalps is less likely to be very venomous is greatly elucidated when you explain that he can use those large claws to rip apart prey and doesn't need deadly venom. This context is easy to understand, and now that they do understand it, they can remember the concept that small claws = deadly venom, as opposed to trying to remember the fact”.

Knowledge and Self

“I would say one of the best effects this course had on me was helping me kick the fear of public speaking to the curb... ..Also, interaction with your surrounding society is key to feeling one with a community... ..It is a great experience to feel connected to the community you reside in”.

“Knowledge definitely is power. I mean most people are deathly afraid of spiders and scorpions, but if you have knowledge of a particular one that isn't harmful, you don't have to be intimidated by it and you can better interact with it free of any fear of harm it may be able to cause you”.

Impact

“The most enjoyable experiences that I had this semester would certainly be those in which I was able to make an impact on others... ..The children that attended these events were always very interested and enthusiastic about learning about insects... ..To know that sparking a child's interest now might have a large impact on how he or she develops and sees the world makes the experiences that I had through this class feel so rewarding”.

“...I feel very fortunate to have had the chance to affect others through this class and to have taken what I have learned through semesters of classroom education at the university and apply these lessons in the real world. This class has given me the opportunity to work with other groups of students and children in ways that no other class has offered. This course has been a part of a great educational experience and one that I would definitely recommend to anyone interested in entomology or in gaining valuable experience in any area of education or child advocacy”.

APPENDIX A6

SPRING 2007 FINAL REFLECTIONS

Society

“...the majority of kids and families in this area that were a part of our outreaches were from lower income families. Often these children have never been exposed to topics such as entomology and therefore were completely clueless and often afraid during our outreaches. Despite being unaware and somewhat weary, many brave kids and parents overcame that fear of the unknown... If I have learned anything this semester about society as a whole, it would be to not underestimate the general public’s desire to learn, but to realize the desire is out there and as active and educated citizens it is our responsibility to become that educational source”.

“I feel I have learned much about society from this past semester’s Service-Learning experiences. Just in the aspect of organizing and presenting the outreaches, I have learned that people are either extremely willing to cooperate or not. Most of the time our class was over booked with outreaches, which is amazing to me. This is amazing because I had no idea the people in our community are so interested in insects... ...I was amazed at how popular we were”.

“This class has taught me that society, in general, does value knowledge. People of all ages find interesting facts amusing. The outreaches we did really were similar to the shows seen on the Discovery Channel. Children can look at and touch bugs they might not normally see or take the time to really look at. The adults also found the insects amazing and really enjoyed learning interesting facts. I feel like society benefits from these outreaches because it allows them to expand their minds and parents can have a good time with their children”.

“The course exposed me to a diverse spectrum of society. From the largely Hispanic population of Fowler Drive Elementary to the collegiate volunteers with Classic City High School, our class encountered people with many different educational and social backgrounds... ...This receptivity toward new information on behalf of the parents of many of the children at science nights surprised me the most of anything I encountered throughout the semester. It was a reaffirming experience”.

“One thing that I learned about society is that they are misinformed... ...People don’t know the truth about insects... ... People are willing to learn regardless of their age. From the preschoolers at Winterville Elementary to the seniors at Highland Hills, everyone was excited (or scared) to see the bugs and hear their stories”.

“...the personalities of children and the personalities of adults do not change a whole lot... ... Society is comprised of many different and intricate people, but through all of the differences there are common themes that last throughout time... ...Society is a bunch of different energies all bouncing around at different speeds and directions, which somehow forms this beautiful piece of artwork we call humankind”.

“I feel that there are many opportunities for people to give back to communities and society in general... ..I know that before I took this class, I never did much in the way of volunteer work nor did I participate in any outreaches, but after having experienced outreachesI find that I actually enjoy giving back to the community. I enjoy seeing people with fascinated looks on their faces when you explain to them why and how... .. It seems that society is hungry for knowledge and a new experience. I feel that a great way to give them that is through the outreaches we do throughout this course”.

“Society is not very tolerant of insects, in general. When entomology is mentioned to most people, they have one of two reactions, “Oh, I love butterflies!” or “Ugh, how can you stand to study cockroaches and spiders?” As with most things, a stereotype is placed on insects from early on and can be hard to replace in one’s mind”.

Teaching and Learning

“After doing many service-learning projects in the community, I learned how much people enjoy learning about new and interesting facts. As a busy undergraduate, I feel as though me and my fellow classmates take the educational process for granted, at times considering learning as more of a chore than a fun activity. So, contrary to public opinion, I feel that our society is not as dull and disinterested as they are made out to be... ..”!

“...The most salient piece of knowledge I came away with was that learning and teaching does not have to be restrained by rigid, standardized guidelines. In fact, fewer guidelines may enhance both learning and teaching... ..”.

“To begin, I feel the processes of learning and teaching are crucial to a well-received presentation; and I feel that it is a difficult, but manageable task. As a freshman, and one who knew little about insects before this course, I found the teaching to be a good challenge. It is hard when so many people come up to you with questions you wish you knew how to answer. However, over the course I began to learn specifics about all the animals we have, and tricks for keeping people interested and involved. At most of the outreaches I participated in I volunteered to hold most of the insects, and even teach to the group about the millipede, the Bess Beetle (my favorite), and the Madagascar Hissing Cockroaches”.

“I think after taking this course, I learn a lot faster when I can interact with the things I am studying. Even though I was supposed to be teaching others about insects, I learned things I would not have normally noticed or cared to learn. I am glad I took this course because it opened my mind up to entomology and has definitely raised my attention for insects”.

“Being the English major of the group, I did little teaching this semester but managed to learn a great deal about insects as well as outreaches in general. I had never taken an outreach or service-learning course prior to this one, and the class has changed the way I view education. Rather than the traditional method of teaching, I now realize there are ways to positively influence a community while continuing to reach educational goals. Certainly the classroom will forever have its place within collegiate degree programs, but service-learning style teaching seems to be a promising new method of conveying concepts”.

“This class has provided me the opportunity to learn on my own in addition to learning with others. After my first outreach I realized that I needed to know more about what I was displaying. I began to do my own research on our bugs. At each successive outreach, I would continue to research all the new questions that people would ask and I wouldn’t know. I began to have a pretty good understanding of our displays and outreaches became easier and more fun. I also enjoyed when international visitors to the outreaches would tell me what things were called in their native language”.

“The best way to teach is to be sincere, aware of the audience, and knowledgeable about the information being taught. I have found that this is the best way to impact the students... .. Awareness of the audience allows for a continual flow of action... ..Finally, without knowledge of what is being taught, the students cannot learn to their fullest potential. It’s kind of embarrassing to say “I don’t know” a lot of times. The students want to learn and I want to allow that”.

“About learning, a person cannot be taught if they are not willing to learn. Information cannot be forced into someone’s head. Encouragement is essential, but it is very difficult when the student is not willing to put in the effort”.

“As far as the learning aspect of outreaches,...it seems that the best method for learning is to get interested or fascinated in whatever it is you are trying to learn.With outreaches, however, we have the opportunity to teach people by showing or telling them something interesting they have not seen before. We invoke curiosity through sight, sound, and sometimes even touch. What’s better? To be shown a plain back and white diagram of the parts of an arthropod or to actually hold a giant millipede in your hand as its shiny black, armor plated body glides across your hand, and you feel the movement of hundreds of tiny legs tickle your fingers... ..”.

Science

“I definitely learned some science content from the experiences during the semester. It really amazes me how much better it is to learn outside the classroom, and how much more impressionable it is”.

“I have to say first of all that I have thoroughly enjoyed this class and will treasure the experiences, memories, and friendships I have gained over the course of the past semester... ..Throughout each outreach in which I participated, I came to realize how little the general public knew about “bugs”, their diversity, and their significance in “our” world. This realization was somewhat depressing to me; since over the past few years as an undergraduate I have come to appreciate (maybe even love) insects and I have found a great respect and understanding of their importance. Thinking back over the outreaches however, I also recall an enthusiasm and a desire to learn that came from not only the kids, but from many parents. It is with this that I find some hope that it is not the desire to learn that is lacking, but just the resources to educate that are not always available”.

“...I have to say that I was very shocked by the number of children and adults that wanted to hold the tarantula!... ... The individuals that held the tarantula had their full trust that we knew what we were doing and as “teachers” we had to gauge what each individual was capable of and reassure them and make them feel comfortable with something they had never experienced... ...Though this idea may seem trivial to us, once a person has this mentality they are more inclined to learn more about an insect they find instead of just trying to squash it. This could lead to a better understanding and respect for the world around us and its diversity and significance. If anything, through these outreaches, our job is to spark the interest that makes a student desire to go out and learn more”.

“I certainly think much differently about insects because of this course. To be honest, I had never held a bug of any kind prior to this course and nearly lost my mind if I found a spider or roach crawling on me. I am much less afraid of insects now I know roaches cannot vector any diseases communicable to humans and most spiders native to Georgia are not poisonous.

“I learned some things about science this semester. As a direct result of my personal research of the insects in the zoo I learned a lot of natural history and have even taken some interest in insect rearing. The main thing I learned was not related to insects. I learned a lot about social science. I learned more about how to teach and interact with people. I have always found it easy to interact with middle school ages and older. This class has given me the chance to practice and improve in relating to younger people while still remaining informal in the approach. I feel that this type of interaction is just as important as public speaking, but less emphasis is placed on it in college”.

Knowledge and Self

“This semester, though teaching other community members, I have learned a lot about myself. I certainly know more about the Entomology Department’s bug collection than when I started the outreach class in January. For instance, I never knew Madagascar Hissing Cockroaches even existed before I took the class! These roaches turned out being my favorite examples when I presented at service projects. This may have been because I would rather pick the cockroaches up rather than the vinegaroon any day of the week! In studying for tests, I feel a good study technique in the future would be to try to teach the material to a fellow classmate”.

“The course had a profound positive effect on me as an individual. I truly loved the experience because we helped increase the knowledge of many area children and adults in a fun and exciting way. Also, volunteering in the community was very gratifying and rewarding because I felt that we made a positive impression on all of the people we met. By growing up in the Athens’ public school, I know that many children are only exposed to educational material solely at school with little or no educational experiences and/or excursions outside of school. Because of this, I feel that it is very important for the University of Georgia to reach out to the community and share their knowledge... ... So, because of this experience, throughout my life I will continue to share my knowledge to the community as well as to volunteer, because it can truly help the community in an immense way”.

“There are definitely things I will do differently after this class. One thing I already see a difference in is my outlook of house pests... .Now I do not want to just call up the exterminator with a bug scare, instead I want to think about why they are thriving in the environment, and how I can compromise with them. I loved this class, and think that everyone should have to take a service-learning class. The experience is so much richer than any textbook could provide”.

“Throughout this course, I have learned many things about myself, society, and learning through outreach opportunities. This course has definitely had a positive impact on me as a student and as a person”.

Impact

“...this course’s impact on my view of the learning process in children will be its most prominent impact. It had been too long since I had seen the sheer joy kids get out of learning or experiencing something new. The Outreach and Service-Learning class reminded me of the pleasure learning should be, and I will take this refreshed viewpoint with me”.

“I have to say that this has been one of the most enjoyable classes that I have ever taken. One thing that I felt very strongly about was trying to reach all different age levels with our outreaches. This goal was accomplished far beyond what I could have ever expected”.

“The major effect that this course has had on me is the fact that I love what this class does. It has shown me that this is something important, not only because the community becomes better educated, but because the community becomes better educated, but because I enjoy doing it. I have always enjoyed volunteering time to help others. I look at education differently. To me, this system of service-learning is the teaching of the future. I see teachers becoming project managers that provide guidance to the student-teachers. Even in elementary education, allowing students to become involved in the education of each other and the community could be beneficial”.

“There is no doubt that this class has taught me and changed the way I look at different things. I am so much more in tune with insects around me and find myself going out of my way to help them out. Also, becoming un-ignorant of the creatures diminishes my fears of them. I eventually held every single insect and arthropod in that zoo. Yes, it may have taken me a while to warm up to the action, but after fully analyzing the situation I was finally able to lose my fear from my chest and simply pick up that tarantula, scorpion, and hissing cockroach. Education is essential to erase the ignorance from our society about how “disgusting” and “gross” insects are... .Also, I really enjoyed working as a team with the class. We all were in this for about the same purpose: to educate! I really like that. We want to show people the truth! What a wonderful thing”.

“After participating in the Entomology Outreach & Service-Learning course, I will definitely consider doing more outreaches and even some volunteer work in the future. I think it has helped me become more confident in my ability to interact with other people and disseminate knowledge to the public. All in all is has been a great experience”.

“I will definitely be more tolerant and kind to insects. I already share information and “trivia facts” with my friends and family; especially the fact that tarantulas do not usually bite – they flick annoying hairs that cause one to itch. My respect for the field of entomology continues to increase. It’s amazing how much is already known about the study, and yet how much is still being discovered each day”.

APPENDIX A7

SPRING 2008 FINAL REFLECTIONS

Society

“After my experience with Entomology Outreach and Service-Learning, I have learned many things about society. The first thing I have learned is that everyone enjoys interactive learning (regardless of their age). At many of the outreaches that I went on the most interactive people were children who were no older than six or seven. Another thing that I learned is that people like insects and bugs a lot more than you think they would! Honestly, when I registered for this class, I always like insects, but I never had a huge appreciation for them until taking Entomology.

“I feel like I have learned that society as a whole values education and educational opportunities. In researching grants that might be applicable to the outreaches and Insect Zoo, I found out that there is so much money available for anything that has to do with learning, especially with the education of children. I, as a college student obviously value education, but I didn’t realize that there were so many government entities that set aside money for educational opportunities”.

“Society as a whole has a general want to learn about new things. Everyone that I met in the processes of preparing, giving or receiving of outreaches was open to learning. I also got a better feel of the Athens community as a whole and now feel more obligated to provide these types of services to the community. There are a lot of people in the Athens area who have little exposure to good educational opportunities, if any at all, and I now have a better sense that people in our society are willing to have people come and teach and provide these types of services that we have done in Ento 3900. People are willing and inviting of educational opportunities and there are different people that would have interest in learning, whether it is the wealthy or the poor”.

“I have learned that no matter how big or small a project may be, it can impact a number of lives within society. Also the tasks you undertake are appreciated by the people around, even those you do not expect. Society is a very overwhelming term that encompasses every sex, race, and religion and through my experiences with outreaches and service-learning I am able to appreciate the beauty and diversity that the word society represents”.

Teaching and Learning

“I feel like the greatest thing that I learned about teaching is that if you are in charge of teaching information to others, you want to learn the information more than if you are just charged with memorizing it for an exam. I know that I did not want to look like an idiot in front of everyone that I was teaching, so I wanted to learn more about the subject matter than what we had learned in class, so that could answer any basic questions asked by the kids during an outreach. I would say that is the greatest thing that I learned about the correlation between learning and teaching. If you are charged with teaching a subject, than you are more likely to thoroughly learn the material. This was especially true for me, because as I stated before I did not have much knowledge about entomology”.

“...I was nervous about the thought of going into a classroom full of kids and teaching them information that I myself had learned the week before, but I found that with the proper preparation and a positive attitude, teaching can be fun and enjoyable... ..However, using hands on exhibits and allowing students to touch and play with the subject matter is both informative and fun. I learned that learning is and can be very fun if material is presented in new and unique ways... ..It wasn't until we got to touch the bugs and look at them up close that I truly understood how an insect's body is comprised. Another thing I learned about teaching is that a teacher needs to make the lesson relevant for the age group they are teaching...”.

“...communication could be very difficult between the teacher and the student... ..kids could learn in different ways, whether it is visually or orally, or at one speed or another... ..It was just a serious adjustment from going from full-time learner myself to having to teach, and I realized just how hard it was to keep the attention of the class, and to still get my lesson across.”

“The process of learning to me is so much easier than the actual teaching. Learning about insects, spiders, and all other buggies is not to bad at all, but when you are the one that is supposed to teach it to a whole class it comes a little more difficult... .. Once you get the hang of getting in front of kids and teaching them it can be very fun and exciting. Seeing them get excited over the smallest thing always brings a smile to my face. Lastly, I will most definitely do things differently because of this class. I guess I can just say that I have a lot more respect for how important insects actually are”.

“In conclusion, I feel that I have learned that in order to really learn something, not just memorize it, you have to apply it to something you do in your life. I tied it to embarrassment. No one likes to be embarrassed and everyone likes to sound like an expert. Therefore, having to put on a presentation about anything will help you learn it as well as you would if you studied it for weeks. This is because presenting something is an active form of learning it where the consequence is embarrassment not just a bad grade or a good grade before forgetting the information”.

“Entomology outreach and service-learning has opened my eyes to the effectiveness of hands on learning. In Entomology outreach and service-learning we used hands on fully immersed approach to teaching. When we presented that children with the insects and taught them about the bugs at the same time, I think it added something more to the experience. The stimulus of handling the insects made the children more curious about their anatomy and characteristics; therefore, they were more attentive and open to us teaching them. It is really a great thing to witness these children being so involved and having fun in the learning process”.

“Through service-learning I discovered and experienced the many overlaps of learning and teaching. When you're teaching elementary school kids about the basics of insects, you are also learning about working with kids. For instance, I once did an outreach for a group of home schooled students. While Joe and I were teaching the kids that all insects have three body parts, we had a student respond with lists of scientific, Latin nomenclatures of these insects. We were shocked by his knowledge, but I realized that people of all ages have the capability of learning – the motivation and ambition are what you have to find”.

Science

“My knowledge in the insect community has also grown in part to the teaching aspect. Learning the material in class and outside of class about insects, and then the ability to apply this knowledge so that others understand the material compounds my overall understanding of the material”.

“From this class I have learned that children are much more willing to experiment and try new things than an adult. For example, most of the adults and college students at all of the outreaches were very hesitant to hold any of the insects if they even held them at all, especially myself. However, I had to fight with the kids to keep their hand out of the venomous, untamed spider’s cage! Additionally, I saw that people are very much like sheep in that no one wants to be the first to hold the insect. However, once the first person holds the insect, most other wanted to. On a more personal note, I wouldn’t hold the hissing cockroach until I saw a ten year old girl hold it; then, I realized it wasn’t going to harm me at all”.

“...I noticed that there was a strong correlation between the young children’s fears of insects and their parent’s reactions to the insects. I also noticed that the students were usually more reluctant to touch insects when the teachers were... ..To them we were the cool college kids who weren’t afraid of the insects, but we knew a lot of neat stuff about them as well... .. Some of the children, despite their fears, were able to draw courage from us and they would handle the insects. After that some of the kids who were deathly afraid at the beginning were actually having fun with the insects... ..”.

“...I had only a surface knowledge of entomology from various natural science classes that I had taken in the past. I also did not really know what service-learning was. On top of this, I was definitely not fond of bugs at all. I did not like cockroaches and was not very interested in any of the other bugs that we have in our collections. However, during this semester, I have gained a better understanding about entomology, service-learning, and now enjoy all of the various insects that we have in our collections. I think that my greater knowledge of entomology has caused me to enjoy the insects, where my lack of knowledge only created trepidation, previously”.

“There were many of the students who were absolutely repulsed, and that reaction had an effect on me too. It made me even less afraid of the insects/millipedes/arachnids because I began to see how harmless they are and how important to the natural world they are. The cool thing about that outreach was that you got to see people overcome their fears and really learn something that they wouldn’t forget. I learned a lot about the insects just by listening to other students answer questions, and I learned more because people would ask me the same questions. So, I repeated answers and found I was learning too”.

“...The level of excitement on the children’s faces at these outreaches was almost uncontainable, and the level of disgust held by some of the older crowd was almost just as much. The children asked many questions like “How many legs does a millipede have?” and “Does it bite?” The children’s level of enthusiasm drove me to understand more about insects and their meaning to the world. Before this class I had little knowledge of the detailed insect world, and now that I have been in many outreaches I really wanted to give the kids the ability to formulate their own

opinions on insects instead of having an outsider feeding those predetermined notions that all insects are bad... ...The honey from the honey bee colony was amazing. I have never seen as many anxious faces with thousands of bees swarming about our heads. Interestingly enough of the faces were not of fear, but intense intrigue as we all understood the honey bees were harmless. Observing the looks on the children's faces indicates to me the target audience for future programs".

"Throughout the semester, I became more and more knowledgeable about Entomology, and as a result I took a huge liking to the subject. The last major thing that I learned is that many people actually like entomology if you show them how much you like it... ...

"Through this class I learned some pretty interesting things about insects and the insect world. Nights before we had an outreach, we would pick up the insects from the biology building and keep them in our room. We would do research on each insect in order to be prepared to teach the youngsters about them in the morning. After doing some extensive research on the insects we used, I now know more than I ever have about these bugs. The bug zoo was a great learning experience for me as well. I learned about bugs I had never known existed. I was educated on the ecosystem of a pond and on the diseases carried by the kissing bug, some great things".

...after attending a few outreaches I realized that I really enjoyed going on them and wanted to do more than the assigned hours. On my first outreach, I really didn't know much about insects. I was very ignorant when I was asked questions. In turn, I wanted to learn as much as I possibly could about these insects in order to not be embarrassed and seem like an expert since these kids expected me to be one. Also, I was challenged to learn not only what I assumed I should know, but also what a young child assumed I should know like "what the biggest bug in the world is?"

"In participating with various outreaches and the Insect Zoo, I think that I have learned that hands-on learning is very effective. When the kids would come in to see the insects, they would point out things that they had learned in class. Seeing the insects up close reinforced what they had learned from their teachers. The kids knew things like what an arthropod was, that scorpions had stingers and how to identify a millipede. I was very impressed with how eager the children were to learn about the insects they were holding or looking at".

Knowledge and Self

"...I have changed my view on society and community service as a whole. I now have a sense and a genuine interest to providing services to the community who need it more than I do. I now feel an obligation to help out in the community because there are a lot of people who benefit from just a little bit of help or genuine care that I can give them. Another personal development that I have found in myself is that I really do not have a set plan for my future. The reason I have felt this change is because in the process of doing outreaches I had developed a feeling of accomplishment and I never really thought about doing anything outside of my Business major. Although I am not going to become an Entomology major, I developed a new appreciation for it as well as a strong appreciation of teaching".

”What this class ultimately taught me with regards to society, learning, and teaching is that you gain an even better understanding of something when you teach it to people, as opposed to simply taking a test on the material. If you use the latter method, you will forget the information once you leave the test, but after teaching information to a group of people, you gain a learning and understanding that sticks with you”.

“Another great part of service-learning was the knowledge and experience that I gained through the process. Not only did I have these revelations about children’s need for influences when they are young, but I was able to remember what it was like to be young myself... ..Working with younger students enabled me to remember that I actually used to have more of an imagination than I do now and that was able to remember information much easier when I was a little kid... ..Working with people who show so much excitement and curiosity about the subject increased my own interest in Entomology as well... ..”.

“I have spent my entire life being the student and it was not until this semester that I was given the opportunity to turn the tables and become a teacher. As I stood in front of a group of anxious looking 5 year olds, I felt a power I had never known; the power of knowledge. I was in that classroom to give those children an experience they had never known and guide them to a point of knowledge. That experience taught me more about the process of learning than anything else within many years. Because of my service-learning through outreaches I have grown a deeper appreciation for the teachers I have had in my life, as well as, opened my eyes to appreciate the incredible education I am receiving at this wonderful University”.

“...Taking this class has taught me things about society I previously was unaware of. As a member of society myself, I learned that if you give things a chance, they usually end up being pretty cool and somewhat interesting. I never thought I would handle bugs in front of college-aged students one week, and then teach a first grade class about bugs the next week. Surprisingly, a majority of the people I attempted to teach were very open to learning and to touching the insects. I learned to never judge too quickly about people and ideas as well...I thought only a very few kids would show up to the Zoo, stay or a brief moment, then leave. What I found was that people are very interested in insects, mainly because they have no clue how interesting and important insects are...”.

Impact

“This outreach class has been an extremely influential course to become proactive in public and environmental matters. It is my belief that students should participate in at least one outreach class to successfully graduate from a university. This class was perfect for me because I was a transfer student attending my first semester at The University of Georgia, and I have been able to see the area and understand the people better within. The smiles and laughter from the public can in no words express the happiness I felt”.

“Participating in the many entomology and service-learning projects has had a very positive effect on me. I feel that I have successfully taught many people about entomology, and I also feel that they have enjoyed learning about it. I look at learning much differently than I did

before taking this class. I have a much more open mind about learning about new material and ideas”.

“...I ended up learning about many topics on many levels, and loving it. This voluntary learning process that society constantly experiences strikes me. I realized that my haphazard step into an Entomology class reflects those steps society makes every day... ..when they go left instead of right or continue straight instead of turning around, they run into new experiences, lessons, and knowledge. The beauty of service-learning lies in its opportunistic, universal nature”.

“Being a Public Relations major, I love working with people and exposing others to new ideas. This course opened my eyes to another way of getting through to people, and that is service-learning. The opportunities are unlike any offered in a sit down classroom. Reaching out to students and the community, I feel like I grew and helped others grow just through this one class. The efforts of this one experience made me realize the impact I could have if I continued with similar projects. I will continue to volunteer in any service-learning environment whether I’m teaching or learning because in the end everyone teaches, serves, and learns”.

“I definitely have a slightly different outlook after taking this class. I, for one, have more confidence in public and a bit more patience. After being in front of groups I am not as afraid to give a public speech, and am in fact taking public speech next semester. Handling these creatures with children can be quite stressful at times, I feel like I have developed a little more patience from my experiences. My view of insects and other creatures has changed as well. I have always respected other creatures, but recently I found myself actually helping them”.

“I think that taking this class and working so closely with other classmates has made us a tight knit group. I have never taken a class where I have interacted so much with all of my classmates. I wish that service-learning could be more incorporated in my other classes, especially when I was a freshman. Going to such a large school can make you feel like just another face in the crowd, but service-learning and working together with other classmates makes the University seem smaller and more intimate”.

“I had done much community service in the past before this class. Because of my experiences with the outreaches and service-learning experiences I’m sure that I will be participating in some form of community service in the very near future. I have a greater urge to help my community because of this class and because of that it has affected me greatly as an individual. I look at my community in a totally different light now. I used to criticize everything wrong in society from the people in it to the environment encompassing it. But because of my experiences in this class I now look at the community I live and try to see what I can do to improve it because now I know what a gratifying feeling it is to make a change within your society”.

“If one would have asked me how insects affect society at the beginning of the year I would have answered “all they do is get in the way”. I now know that insects actually are very important to our economy and our society... .. I was very ignorant about the impact of insects in the society before this year... ..A lot of people have a fear that any type of insect will harm them; when in fact most insects are harmless. The good thing about kids having certain beliefs about insects is

that we got to teach them about the real facts about insects. Seeing the kids faces' getting excited is a really good feeling".

"I know see things much differently since attending this course. I now volunteer on a regular basis, and attempt to help all that I see needing a helping hand. My respect for nature, especially insects, has grown as well. My main focus is now to help the environment one step at a time so that future generations have the ability to see the world's beauty like I see it now. This course has made me a happier person both to be around and how I feel internally... ..I was not only able to understand the insects more, but was having fun teaching it to others"!.

"After taking this class, I feel as though I am a better person. I really enjoyed helping the community and I found entomology to be quite interesting and way more enjoyable than I originally planned. I learned new things about insects and have tried to pass along the information to friends and family. I no longer look at bugs as gross creatures, but rather as important environmental contributors that many people take for granted. I also learned about learning and teaching and the various methods that work best".

"This class helped me realize that it is our duty as humans to help and teach our fellow man about the things that surround us".

"The effect that I appreciate the most about taking this class is that it taught me a lot about something that I knew almost nothing about before. I really enjoyed seeing how the honey is produced at our bee hive at Classic City High School, but before, I would have never considered getting close to a swarm of bees... .. I live in a fraternity house that is sufficiently disgusting, and one night this semester I woke up with a cockroach crawling on my face. If this had happened to me before I took this class, I think I might have freaked out and slept in my car for about a week. But, after holding the Madagascar hissing cockroaches and seeing that they are harmless, I merely swatted it away from me, and rolled over and went back to sleep".

"I have developed a more positive outlook on America's future education. Searching through my memories of what I learned in grade school, I can't recall very many times, if any, that I had older college students care about trying to share knowledge with me... . This lack of interaction between students with higher education and those who are just starting on the journey is harmful in many ways... ..Service-learning expands on that concept and basically brings the field trips to the role-model starved children".

APPENDIX A8

UNDERGRADUATE OUTREACH SURVEY RESULTS

Why did you begin helping with UGA Entomology outreaches?

To become involved in the community, and to help others.

It is apart of the threefold purpose of a university- Education, Research, and Outreach. I would be failing myself and misrepresenting the university if I did not participate in outreaches

Because I have always loved helping other people out, and I was interested in learning about service learning.

I heard about the class from friends

A friend recommended it

I heard that the outreaches were a lot of fun, and I've enjoyed doing outreaches with other programs at UGA.

I've never participated in an outreach before and I thought it would be a good thing to experience before I graduate

I was interested in an entomology major and took an outreach class in pursuit of the major.

Mary-Anne suggested I take the class, and I wanted to do volunteer work

I first started helping with outreaches last semester as part of the outreach and special problems class

I needed the hours and this class sounded very interesting.

I work in the office and was already helping out with occasional outreaches. I might as well get class credit too :)

They are a great way to meet people in the community and be a positive role model.

Because it was part of a study abroad course i took this past maymester.

Please describe an outreach in detail. Include insects shown, any special activities, etc.

The outreach I liked the most was one that we attended to assist in the restructuring of a school in need, and to help in the care of the bee hives. The school was in need of some maintenance, and so several of us went to paint and organize a shed in need at the school. We also got a chance to get with some of the kids at the school and check out an awesome bee hive.

The table display outreaches were fun because it provided a fun atmosphere for kids to learn without feeling the pressure of school. This is where many volunteers learn that people are looking to see if you are excited about the event, your outreach, and your love for the field of entomology. If you were anything except genuine, people and most especially kids could care less about what you were doing. The wow boxes, live insects, and volunteer personalities really lent itself for having successful outreaches. I am really thankful for Grant Howell and Krishna helping out with these outreaches. People really flocked to us when we worked those outreaches. As well, it helped give each of us, much needed breaks.

One outreach was the insect zoo at UGA. We displayed every insect besides a few of them. The outreach went really well. People would come into the room and walk around and ask questions about the different insects. There were also games in the hall.

I, and about four other classmates and our professor, gave a presentation to two classes of education majors at UGA. We brought some of the live insect collections such as bess beetles, madagascar hissing cockroaches, and a scorpion to the class. We also brought along some Wow boxes. We taught the students about entomology and also helped teach them how they could teach others about entomology in the future.

scorpions, bess beetles, madagascar hissing cock roaches, millipede, black widow, tarantula, and cases of pinned insects to elementary students for 45 minutes, at the end there is an arts and crafts activity, they are able to touch and hold some insects

We went to Fowler Drive Elementary School and showed the students some of the bugs from our insect zoo. Half of the outreach was spent talking about bugs and showing them some of the insects such as the bess beetle and hissing cockroach. The other half of the outreach we made bug hats. They colored pictures of bugs, cut them out, and attached them to paper hats.

One outreach was done at a daycenter center on Olympic drive (i forget the name) we took a mantis, walking sticks, bess beetles, and a tarantula to the outreach, along with several display boxes, one for GA species and others with exotic and colorful species.... we let kids handle the bess beetles in order to get acquainted with handling insects

In one outreach I participated in, three groups of students (approximately 20 in each group) came into one of the biology labs. I gave a short (about 15 minutes) talk about the arthropods we had on display. The insects we had included Madagascar hissing cockroaches, termites, bess beetles and peppered cockroaches. We also had millipedes, tarantulas, an emperor scorpion and a whip scorpion. After the presentation the kids were allowed to hold some of the insects and get a closer look. They were also encouraged to ask questions that they may have had. Other activities include drawing a path with a pen to show how termites use pheromones to navigate, and insect sheets that the kids could color (we hung these in the hall of the Biology building).

Outreach at an elementary school science fair, showed most our insects and arthropods. Let them hold the millipedes and the Bess beetles

Whit Davis Elementary School - Project Focus Live animals shown: Millipedes, tarantula, emperor scorpion, whip scorpion, hissing cockroaches, peppered cockroaches, stick insects, bess beetles. 5 Wow boxes including the insects of Georgia. Special activities: Made hats out of student colored insect pictures.

My favorite one so far has been the Athfest outreach. It is tons of fun and this is a time that we can really tell and show the community about UGA'S Entomology program. I like it because all of the small children come and they get to see bugs that they normally would not see.

I like doing Biotechnology outreaches along with Entomology. There are many common myths in both fields that need "demystifying" by myself and others. The DNA fingerprinting/crime scene is fun to do with participants. All ages can grasp the concept and enjoy it!

What were the reactions of those involved with the outreaches? Please include any direct quotes, especially from those benefiting from the outreach.

The individuals had huge smiles and laughs, and were very welcoming to all the help that we had offered.

Most of the response has been I did not know that the University Entomology program offered outreaches for small children and schools.

The Macon Museum of Arts and Sciences sent me a letter personally thanking me for my time and how people were happy with both my lecture and my attention to their questions. That was truly rewarding and I look forward to helping out again.

Everyone who participated in the outreaches seemed to really enjoy them. There were two primary ways that the outreaches that I partook in were presented: through walking around and people asking us questions. The second was presenting a powerpoint presentation to the class.

Most of the people were excited to be about to hold and handle the insects. Some were initially hesitant, but most really enjoyed the outreach and learned from it.

Some kids are very interested and want to touch everything... others are a little hesitant and seem a little scared by the insects, live or dead.... same with the parents

some were interested, some were scarred, and some didn't care. I was surprised at how many things they questioned and how many myths people think about insects.

The kids were very excited and asked lots of good questions and also knew the answers to many difficult questions I asked.

The children seemed to enjoy the outreach overall. The kids got quite excited about our zoo and scared when we showed them the scorpion and spider.

"EW!" and "WOW!" and "Can I touch it?"

A lot of people freak out when we handle the tarantulas and emperor scorpions. If only they knew that they were essentially harmless to a human.

One high school student asked me whether banana vaccines are probable. I explained how to research the topic for herself at home - she planned on using it for a class report.

everyone.

Both the project focus students and the teachers were all very excited before the outreach and very thankful afterwards.

Which type of outreach did you find to be the most personally rewarding and why (Guest lecturer vs. display booths, elementary vs. older audiences, schools vs. community events, etc.)?

School events to me seemed most rewarding because I was able to help the younger audience directly, and hopefully sparked something inside of them to do the same as they get older.

Guest Lecturer was probably most rewarding because the focus was on what I was teaching the audience. No distractions- just attentive eyes, open minds, and rampant curiosity for the topic.

The outreach in which me and two of my classmates went and taught at an elementary school in Athens. The kids really seemed to enjoy it.

I found that the younger audiences were the most rewarding, because they were not afraid of the insects.

Elementary schools because they seem the most interested and excited about the subject material.

elementary and the old folks home and guest lecture and school events. Because these tend to attract more. but really they all are very beneficial.

i like the outreaches with children as opposed to those directed towards adults, such as the GA science teachers conference that we outreached at... the kids seem more enthusiastic and more willing to ask questions and to learn

All types have their own strong points, but I feel that my favorite is a display booth at community events with children. This is because if someone comes to a community event (and even more, up to a booth) they are there because they want to be there, not because it is required by their school, and therefore are more receptive to the information. I prefer a display booth because it enables me to tailor the information to a specific person, as opposed to many people

who may have different levels of understanding of the material. Finally, I prefer younger kids because they are untainted (at least some of the time) by the social stigma that insect suffer.

I felt that the elementary school outreaches were the most rewarding to me personally. The children are eager to be there and want to participate. They are also some of the most willing to hold the live insects.

guest lecturing, any audience, and any environment. no matter who we are speaking to and where we are speaking, people will be interested. i prefer guest lectures over display booths so we can have a set plan and interact with the people more, that way i also feel we can teach more

i think both types of outreaches are equally rewarding. you just get different things out of each. The guest lecturer ones are rewarding on the basis that they give you a chance to improve your public speaking skills to a large group. whereas the display booths have more one on one impact, b/c only a few people can be in front of your booth at a time. As far as the audience as long as they are interested, I like teaching anyone about entomology.

I really enjoy all of the outreaches but my favorite is with small children. They are so amazed by the insects and they have many questions to ask about them.

Elementary students are great to work with. They are so enthusiastic and look at you like you are their hero at the moment. Some can be so appreciative and kind which is so rewarding in itself!

What long-term/lasting impacts do you believe these entomology outreaches have on local and university communities?

I believe these have very positive impacts on the public, and will encourage others to get out and help others in need whenever possible. The ability to help someone is in all of us, and these outreaches tap into that resource.

We may not get through to every person who approaches our events, but we will get through to a few. Those few will influence their friends and the knowledge learned will move forward until a great many people understand the importance of invertebrates. This translates how "the few" influence and sway "the many."

I think that it strengthens the bond between the community around us and the university's

The outreaches broaden the horizons of the people that experience them and teach them something that they might have never learned otherwise.

It bridges the community and university very well. Continued outreaches in many different subject areas should continue, in order to improve the educational levels of the public.

education, and appreciation for insects. People become more comfortable with them and in return become more willing to look at the environment and want to make it a better place.

The major result for the kids is an introduction to insects as an interesting subject of study, as well as showing them that there are people who do study insects for a living. For those who are teaching at an outreach, it helps them become a better teacher and learner. It really makes you analyze the processes of learning and teaching.

For one, they let those whom we put on the outreaches for know what we are learning at the University and possibly of any research that we may have in different fields of entomology. They also give the children that we teach in some of these outreaches a chance for hands on learning from someone other than their in class teacher, which i always liked when i was a kid.

make people aware of the goodness of insects. allow students to volunteer. make an impact on our communities and at the same time, giving our school a respectable name

introducing kids to the idea of handling insects is nice... i also believe that we make children more apt to observe their natural environment and take interest in learning about it

I feel that the lasting impact is a better understanding of the insect world. So many people are afraid of insects and the ability to get up close to the displays and hold some things can help to dispel some of these fears. Also, learning about this area of science from people well educated in it can help with myths or non-factual information they have learned.

Hopefully, they will help people, such as myself, be less fearful and hesitant to deal with insects.

Our outreach programs help educate the community about the different insects in Georgia. We are also able to bust myths about many of the insects and this helps people not be afraid.

Education is a very powerful tool and we are butting it to good use by educating the young and old in the community.

What are your career plans after you graduate?

I plan to go federal in my work field, and hopefully get into the CDC, or become involved in the FBI/DEA.

Law school

Completing a non thesis Masters in Forest Business and then probably work for sometime before going back to school in forest entomology.

Work in finance as a trader on the floor of an options or stock exchange.

not sure

moving to Missouri... hopefully finding a well paying job.... grad school?

I'll tell you when I know...

I will be attending medical school next year at MCG in Augusta.

I would love to work with the Cooperative Extension Service.

I want to receive my Masters in Physician's Assistance.

I would like to start working a full-time job in an entry-level management position, but where ever the pay is best, that's probably what I will do.

I plan to go to Physician Assistant School at MCG.

I am applying to jobs and interviewing to different pharmacy schools.

Hopefully I will go to graduate school

Will the lessons and experiences you gained through the Entomology Department's outreaches have any relevance or influence towards the next stage of your life?

Most certainly, I have already become more active in the community, and have a sense of accomplishment.

We cannot and should not squirrel away our understanding of our most misunderstood animal life on earth. It is both our duty and responsibility for people to understand invertebrates and the roles they have directly and indirectly with our own lives.

Yes, it has taught me how to get speak in front of others and it also taught me how to engage others.

Probably not in a direct way, especially with the career path that I have chosen. But I think that it will affect me in a more personal way, because I will be more likely to want to experience nature on a more personal level. For instance, I go to the State Botanical gardens occasionally and go hiking now, because I am more interested in nature.

of course, everything I enjoy does, and i enjoy the outreaches.

Yes, I feel as though I will be able to better communicate and relate to the general public and diverse groups of people better.

Sure

Yes; in any profession (especially medicine), the ability to effectively communicate is necessary.

That's yet to be decided.

YES! Making people aware of truths is what I want to participate in through life.

yes it will help immensely due to the nature of the profession I am pursuing. PA's deal with people on a day to day basis and these outreaches have helped improve my people skills. The more interaction you have with people the better of a people person you become.

Definitely. It has shown me how much I love to educate people.

Most definitely - I've improved on my interpersonal communication skills and been exposed to people with different backgrounds (cultural, educational, etc).

Is there a specific direction you would like to see future outreaches through the Entomology Department take, such as targeting a specific sector of the community?

I believe that the younger crowds should be tapped into. Due to the fact that they are our future, and lead the way into a more positive future with role models to look up to.

Enhanced communication with teachers at local schools about a topic in particular like honey bees and bee colony collapse and what they want their students to better understand from a particular outreach.

I think that the entomology outreaches are doing a good job of targeting the right age groups and the right demographic within the community around us.

No. I think that we should continue to offer outreaches to all different ages and groups of people, because I feel that most adults are just as ignorant about insects as children are.

I would like to see maybe more focus on one group so that they don't only grasp the basics but become more involved

I would like us to form more relationships with elementary schools in the area and expose them to more science, since the students don't receive much scientific curriculum.

Not really, it seems like we do a good job of having lots of outreaches and contacting different sectors of the community... we can only do so much

I think that the entomology department and other departments would benefit from interdisciplinary outreaches that would attract more people.

I would like them to be scheduled outside of class times: Later in the evening or on weekends.

I would like to see the department "adopt" a school for a semester. By doing this they could set up some displays at the school and make regular visits to the school to educate at all different age levels. Currently we tend to hit one or two classes and move on to the next school. I would also like to see displays set up in more random places (the mall, tate plaza, dorm lobbies).

I think it would be cool if we started teaching people about the medical importance's and threats that insects really do pose to humans. Incorporate a bit from what is taught in Med. Ent.

Perhaps middle schools, but early ages, to insure they are properly educated about insects and their benefits.

Department's outreaches have any relevance or influence towards the next stage of your life?

Yes, Hopefully I will continue in the field of Urban Entomology. I have learned how to deal with the public and children. This is a tool that I will continue to use throughout my career and life.

I think that it is great that we have included older groups this year for outreach. I would like to see more outreaches at retirement villages.

APPENDIX A9

GRADUATE OUTREACH SURVEY RESULTS

Why did you begin helping with UGA Entomology outreaches?

I enjoy it

It was an opportunity to brush up on some general entomology stuff; also, I feel that a public university owes its community this service. I believe that if we are to alleviate the sorry state of science education in GA, we must all play a part; NOT just stay in our isolated university setting.

you if you can't talk about bugs in general?

In order to spread the word of entomology to younger students; to spark an interest of the general public of our field of work

Please describe an outreach in detail. Include insects shown, any special activities, etc.

At BSES I did small group activities with Mrs Nobles Pre-K class. I took boxes of pinned insects and introduced students to insect in Athens GA that they might encounter in their backyard. I had them do a craft activity and ended the session with an ID quiz where all students earned prizes.

I tailor my outreaches to my audience. If they are kindergarteners, they get the "what is the difference between an insect and a spider?" If they are high school, I will arrange the critters in evolutionary order and use them to explain natural selection. Sometimes I focus on forensics, sometimes on chemical defenses, sometimes on invasives. It really depends upon the group. Experience has definitely been my best (and really only, as far as outreach goes) teacher.

I recently participated in an outreach at Champions for Children child development center. I was the guest speaker at the center for the "insect week." For this event, I highlighted basic insect education, helpful insects vs harmful insects, I talked about pollination, showed a collection of insects that can be found locally in Athens and also carried a container of soil that had VBC pupae buried about 1" deep to leave in the classroom so the kids could see the moths emerge themselves

What were the reactions of those involved with the outreaches? Please include any direct quotes, especially from those benefiting from the outreach.

They loved it!

Most were impressed, all were pleased, many made repeat requests.

The kids always eat it up. They love seeing and touching the insects. The parents also get into it by asking some questions, for example, if "hissing cockroaches bite".

The kids and teachers alike were fascinated by the insects, many seemed genuinely surprised by the diversity of insects that could be found in their own backyards.

Which type of outreach did you find to be the most personally rewarding and why (Guest lecturer vs. display booths, elementary vs. older audiences, schools vs. community events, etc.)?

elementary audiences I find particularly responsive. I also enjoy doing home schooled groups

Poor, underprivileged students. Their schools don't have the money for field trips or guest speakers who are paid, so for me to be able to go on site and bring cool things was a really big deal to them.

Schools and community events because we are able to showcase everything that we are about, whether it is for a 5 year old or a 50 year old.

I prefer the one-on-one type outreaches with the elementary school age children and younger audiences in general. I also enjoy being an invited lecturer.

What long-term/lasting impacts do you believe these entomology outreaches have on local and university communities?

increase insect science awareness and appreciation

For some students, it may be the only time they see a real scientist up close and personal. I really like dispelling the myths about science, especially where females are concerned. In the University, our most well rounded students are those who actively participate in outreach. Research and education is worthless in a vacuum.

I hope that these outreaches will help to show that entomology is a broad field of interest and that these children may one day be interested in that same field.

I think it helps to foster a sense of awareness and appreciation for our insect friends by the wider community and I think that the department of entomology benefits directly from this type of positive PR.

What are your career plans after you finish your program of study?

position in extension or related field

GET A JOB! I want to be a professor at a smaller college and build my own outreach program. I am interested in teaching as much as research, so I don't want to be limited to only teaching one class per year.

Either looking for a job or continuing with a Ph.D. but unsure as of right now.

Professor/lecturer at a university/college, barring that, I hope to work in research in a biotechnology company that would allow me to utilize my knowledge and skills in the area of insect resistance.

Will the lessons and experiences you gained through the Entomology Department's outreaches have any relevance or influence towards the next stage of your life?

yes

My experience with outreach has had more effect on my career choice than any other thing I've done here.

It definitely teaches you how to help with those who don't know. It is a great experience and I wish that more people could benefit from it.

Yes, I think so.

Is there a specific direction you would like to see future outreaches through the Entomology Department take, such as targeting a specific sector of the community?

Not really, but I sure would like to see more students get involved. The same students from the same labs carry the torch year after year. I'd also like to see some faculty members be more on board with it. After all, what kind of entomologist are 7. Please describe an outreach in detail. Include insects shown, any special activities, etc.

The students and parents basically asked a lot of questions and we answered them to the best of our ability. We had hissing cockroaches, bess beetles, a scorpion, and a tarantula as live specimens. We also had insect of Georgia pinned for the people to look over.

I think toward the general public -- more like the UGA Insectival -- only because everyone should know how beneficial insects really are for the planet and our daily functions.

I think it would be great if we could become more active in elementary school education where we mentor or partner up with teachers to help in biology/science/entomology instruction and even help kids by being active members of their insect clubs.

APPENDIX A10

COMMUNITY OUTREACH SURVEY RESULTS

What is the name of the organization you are with (school, community group, nature center, etc.)?

State Botanical Garden of Georgia

Walton County School System-Monroe Elementary School

UGA

Let's Get Wild, Inc.

Morrow Branch Library, Clayton County Library System

Sandy Creek Nature Center

Fernbank Museum of Natural History

What is your organization's address?

Athens, Monroe, Athens, Watkinsville, Morrow, Athens, Atlanta,

What age group does your organization serve?

All ages, Elementary school, All ages, Elementary school, All ages, All ages, All ages

Why did you request a UGA Entomology outreach?

To partner on a major family festival titled Insectival. Also to display insects at forest festival.

The Entomology presentation is always a highlight of our Title I Family Science Night - Students AND parents love the displays and specimens - and the "hands on" with some of the insects!!!

I was doing an educational program for kids and needed something really outstanding (bugs) to catch their attention.

For our Summer Camp which is ages 10 - 13, boys & girls

Our summer reading theme was "Catch the Reading Bug," so this program fit nicely with our theme. Also, kids love learning about bugs, for the most part.

To help with events that involve insects and other crawly critters.

5. Why did you request a UGA Entomology outreach?

the UGA Entomology outreach is a great resource on insects. They provide an excellent display complete with both live and pinned insects that I could not otherwise provide for our guests.

How many outreaches has UGA Entomology done with your organization?

>6, 5, >6, 2, 1, 1, 1

Please describe the outreach in detail. Include insects shown, any special activities, etc.

At Insectival the students typically brought between 15-20 species. They provided meaningful interpretation and a hands-on experience with insects to families. They prepared appropriate signage and displays; they staged roach and bess beetle races; wore insect costumes; collaborated with faculty and community members to stage a butterfly release; helped plan and publicize the event and more.

Hissing/giant cockroaches, tarantella spider, centipeds and millipends, winged insects, etc.

We have partnered with Paul Guillebeau extensively, and used the Bug Zoo one time. A wonderful grad student helped with the bug zoo.

Wow, it was two years ago: hissing cockroaches, scorpion, tarantula, walking sticks; we used nets to catch insects.

Students showed the kids the different bugs from this area, and spoke in detail about these. Then the children were able to hold some of the insects and ask questions.

In the past year, the entomology club helped with our Scary Oozy Slimy Day (halloween event). Since that was in October, I don't recall. The creepy crawlies are always a hit with this event. In other years, the club has helped with open houses themed about insects

Both live insects (beetles, hissing cockroaches, and spiders to name a few) and pined insects displays were brought. In addition to the large display that spanned three tables, the club members handed out cups and Frisbees.

What were the reactions of those involved with the outreaches? Please include any direct quotes, especially from those benefiting from the outreach.

Fantastic. Extremely well received. Attract a crowd of 1000 - 1400 people each year. Sorry, no direct quotes available.

This "station" at the family night event has gotten so popular, that the last time our school sponsored a family science night event, students and parents were lined up around the perimeter of the cafeteria to see the display/specimens! Squeals, laughs, Yeeks!, etc. - We always include a picture or two of students and their reactions in our local community newspaper - The Walton Tribune

Program participants gave all positive feedback

The room was packed to capacity and some of the kids had a hard time leaving. The students were very well-informed and helpful and patient.

The kids loved it.

Visitors thoroughly enjoyed the opportunity to see the insects up close. The table was full of children and their parents fairly solidly for the entire event. Guests especially appreciated the opportunity to touch the insects, and the UGA Ento club provided a safe and educational demonstration for this to happen.

People always enjoy learning about the insects. The members do a great job educating, not scaring people

What long-term/lasting impacts do you believe these entomology outreaches have on communities?

A deeper respect for the nature world; interest in science careers; direct knowledge about insects; strengthening family relationships.

Weeks and months later, students will ask if the "bugs will be back" at family science night. Other schools in the Monroe community have heard out the great family response to our family science night events - "word of mouth" says a lot about the excitement of science night!

Increased knowledge

True facts (not myths) were taught and changed some kids minds about the danger and fear of insects.

They're very educational and help kids get interested and involved in the world around them. This particular program also helped promote reading about insects, and the library in general.

It helps them to see the benefits of insects. Also, that size of an animal does not make it any more or less dangerous than another.

There are many negative connotations when the average person thinks of insects. Media tells us constantly they are vicious creatures, society tells us we should spray them with chemicals. Opportunities such as this provide opportunities to learn insects and their place in the animal kingdom. The UGA Ento club helps to provide appreciation for animals that many people are afraid of and often misunderstand.

Will you continue to request Entomology outreaches in the future?

Yes, Yes, Yes, Yes, Yes, Yes, Yes

What lessons and experiences do you feel your students or the community gained through the Entomology Department's outreaches?

Overcome fear of insects; understand vital role of insects in ecosystems and their importance to humans

The excitement and enthusiasm of the UGA students who exhibit the insects is contagious and our children learn to appreciate the insect world. Also, exposing our families to college students is an extra benefit.

Integrated pest management

Same answer as #9, and the fact that everything is connected and serves a valuable purpose.

I feel they learned that insects don't have to be scary, but can be interesting and beneficial to our environment.

The opportunity allowed both children and adults to understand that insects have a place in the natural world just as other animals do. They learn

Is there a specific direction you would like to see future outreaches through the Entomology Department take, such as targeting a specific sector of the community?

No

We have always been pleased with the programs presented. We may want to also consider Entomologists as career "guests" at our Career Day event held in the spring. Unfortunately, the dates often conflict w/finals @ UGA.

Not sure - currently your outreach program has served my need.

For the format I have, the opportunity you can provide is ideal.

If not already doing so, maybe do outreaches to community centers or boys and girls club. Those children seem the most afraid, yet curious, of unusual critters.