PARTICIPATORY COMMUNITY EDUCATION TO MITIGATE HUMAN-ELEPHANT CONFLICT IN BOTSWANA

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ABSTRACT: In northern Botswana, conflict between subsistence farmers and elephants can result in destroyed agricultural crops and death for both species. In June of 2016, students and faculty mentors from four universities traveled to the Okavango Delta region of Botswana to participate in a community education project designed to develop locally relevant solutions to mitigate human-elephant conflict. Local farmers and community members partnered with university students to design solutions and build prototypes of those solutions. In this paper, we present findings pertaining to the university students' experiences, perceptions, and learning during and as a result of the workshop, including ways in which expectations and the actual experience were aligned and the experience of partnering university students with members of the local community. Findings indicate that future, similar projects should work to ensure an appropriate balance of instruction attention between the local and student participants. Successes include open dialogue and collaboration among all workshop attendees, application of university coursework to address issues of problem solving, design, working with diverse groups, and co-creation of prototypes of simple machines, tools, and devices ready for use and testing by local farmers.

Keywords: experiential learning; collaborative design; non-governmental organization; development; problem-solving

In northern Botswana, conflict between subsistence farmers and elephants can result in destroyed agricultural crops and death for both species. Current solutions to prevent elephants from raiding crops are typically low-tech and less effective than desired. For example, farmers may use chili peppers, which deter the elephants, but elephants are intelligent enough to navigate around the chilies. More sophisticated deterrents are needed to protect the elephants and the humans in this region; unfortunately, known effective solutions are too expensive for these communities, thus creative design using local materials could provide the best solutions.

The goal of the educational program at the center of this study was to create effective, sustainable, and culturally appropriate solutions by partnering university students (from American, South African, and Botswanan universities) with diverse local participants, including men and women, and a variety in age and social status. We used English and the most common local language, Setswana, for the workshop. The lead facilitator provided English instruction, which was translated in real time by the co-facilitator. For the team design portion of the workshop, we required groups to have speakers of each language. During the program, students and locals collaborate to identify specific challenges and develop solutions' prototypes. The innovation of this project derives from the inclusion of the participatory community education in conjunction with conservation efforts around human-elephant conflict in the Okavango Delta region of northern Botswana. In this paper, we present findings from the project evaluation, including successes, opportunities for improvement, and possible adaptations to other contexts.

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The purpose of this paper is to (a) present the background and context of human-elephant conflict in Botswana and the community development workshop at the center of this study, (b) share preliminary findings from a study of university student experiences in the workshop, (c) identify successes and opportunities for improvement of the present community education program in partnership with the international, collaborative experience for university students, and (d) begin to explore ways to apply or adapt this program model to other contexts.

Background and Context

At the center of this study is a weeklong workshop conducted in Seronga, a remote village located in the Okavango Delta region of northern Botswana. The Okavango Delta is known for being the largest inland delta in the world and is crucial for most of the wildlife in this water scarce region. Human population levels are low and the region is known for its dense wildlife. Eco-tourism is an important industry for Botswana and the government places great value on conservation of wildlife. The region is home to one of the most important ranges for elephants left in Africa, as well as lions, hippopotamuses, zebra, ostriches, crocodiles, and numerous other species drawn to the seasonal water source. Wildlife conflict, particularly with elephants, creates additional challenges for farmers in the region. In order to help mitigate this conflict, we invited farmers and representatives from 14 communities in the region to participate in a workshop aimed at co-creating effective, sustainable, and culturally appropriate solutions alongside university students. The workshop occurred during one week of June, 2016. Roughly three days were spent on the design process, team building, and generating consensus around the problems small groups would like to tackle. Small groups then worked to design and build prototypes that would in some way address the problem. The end of the fifth day was dedicated to project show-and-tell and a large group debrief. For students traveling to and from the U.S., the trip also included three days of travel to get to Seronga and two days of travel to return home.

The workshop was hosted by Ecoexist, an internationally-funded, locally-based non-governmental organization. Ecoexist's mission is to "support the lives and livelihoods of people who share space with elephants while considering the needs of elephants and their habitats" (Our Response, para. 1). The present workshop was a component of their work to "empower farmers with practical, affordable, and effective tools to deter crop-raiding and reduce conflicts with elephants" (Our Response, para. 4). Their leadership and contributions, both financial and logistical, were critical to the success of the event. Ecoexist coordinated the location of the workshop, engaged the local farmers and community members through their extensive network of partnerships, funded travel, food, and lodging for local participants, and coordinated the participation of the students from the University of Botswana (UB). The three co-directors of Ecoexist, Drs. Amanda Stronza, Anna Songhurst, and Graham McCulloch were in attendance, as were a number of other personnel. Ecoexist projects are coordinated through local community liaisons, Ecoexist Community Officers, or ECOs, one from each village. Of the ECOs, 14 attended the workshop (three women and 11 men), as well as eight farmers (seven women and one

man), identified by the ECOs as individuals willing to explore new farming and wildlife deterring practices.

The workshop was led by Amy Smith of the Massachusetts Institute of Technology (MIT) D-Lab and co-facilitated by Thabiso Mashaba of These Hands, a Botswanan non-governmental organization (NGO). D-Lab's mission is to build "a global network of innovators to design and disseminate technologies that meaningfully improve the lives of people living in poverty" (About D-Lab, para. 2). The workshop, which focused on design thinking and process, is part of D-Lab's outreach to people in developing regions around the world. The aim of this and similar workshops is to encourage and grow the skills for individuals to create their own solutions to local challenges. Smith and D-Lab provided the curriculum for the workshop and brought facilitators skilled in the design process to lead and support the small group projects.

The various stakeholders in this workshop were brought together and coordinated by Assistant Director Dr. Leslie Ruyle at the Texas A&M University (TAMU) Center on Conflict and Development (ConDev). ConDev's mission is "to improve the effectiveness of development programs and policies for conflict-affected and fragile countries through multidisciplinary research and education" (About Us, para. 2). Conflict between humans and elephants falls within their purview.

Finally, university students from TAMU, UB, MIT, and the University of Stellenbosch (SU) traveled to participate in the workshop along with a number of faculty mentors. This experience was considered a high-impact practice by the institutions involved, incorporating both international experiences (for the TAMU, MIT, and SU students), and service learning (for all). Students not only encountered other cultures and ways of life but also had the opportunity to contribute their subject matter expertise and problem solving skills to the project.

Conceptual Framework and Methodology

The study is situated in the context of the previously described community development workshop and focuses on the experience and perceptions of the university students engaged in the workshop and interacting with rural Botswanans. To effectively capture the perceptions and experiences of the university students, an interpretive approach was applied to design the study.

Experiential Learning

In the workshop at the center of this study, the instructors from all institutions applied experiential learning and adult education methods to teach university students and rural Botswanans how to use critical thinking and engineering, design, and business skills to develop sustainable, locally-appropriate solutions to problems, with a particular emphasis on the conflict between humans and elephants unique to the Okavango Delta region of Botswana. The students came to the course with concrete experiences that inspired them

to find solutions to the problems they saw in the world, including poverty, environmental degradation, and harm to wildlife.

Faculty mentors applied teaching methods and strategies to provide students with experiential learning opportunities in alignment with Kolb's (1984) cycle. Abstract conceptualization in the form of storytelling and lectures was used to provide an overview of the skills students would need for the workshop. Necessarily, during the workshop, students were fully immersed in the local context and were learning through concrete experience.

Much of the course design incorporated active experimentation to prepare students to apply their learning to concrete experiences. A design-process model, designed by the MIT D-Lab faculty, was used to ground students in a design thinking. The workshop culminated in presentations of the small group prototypes to the rest of the workshop participants. The presentations moved students beyond active experimentation, applying solutions to artificial situations, to a concrete experience, applying concepts to a problem existing outside the classroom (Ferguson, Makarem, & Jones, 2016). The reflection activities gave the students the opportunity to move through reflective observation, which is an experiential learning component missing from most science, technology, engineering, and mathematics (STEM) programs (Zarestky, 2013). The reflective activities also provided the bulk of the study data, as described in the following section.

Participants and Data Collection

All 13 students participating in the workshop were eligible for participation and all 13 students elected to participate in the study, although not all students participated in all parts of the data collection. All study participants were university students: four from Texas A&M University (TAMU), College Station; two from Massachusetts Institute of Technology (MIT), Cambridge, MA; six from the University of Botswana (UB) in Gaborone; and one student from Stellenbosch University (SU), South Africa. Students' ages ranged from 19 to 26 years and four of the 13 students identified as female. Nine students were enrolled in bachelor's degree programs, or equivalent, two were masters' students and two were doctoral students. Among the 13 participants, five different nationalities were represented, including the U.S., Botswana, South Africa, Lesotho, and Costa Rica; two of the U.S. citizens were naturalized. Students' majors were primarily engineering or computer science (11 of 13) with one public policy major and one biology major. The researchers assigned pseudonyms to participants for the purposes of the study.

Data consisted of four components: a pre-workshop survey, reflection journals, a brief, individual interview, and observations conducted by the researchers during and throughout the workshop. All study participants completed a survey prior to the start of the workshop and participated in an individual, in-person, semi-structured interview at the end of the workshop. Interviews lasted between 15 and 45 minutes and were transcribed verbatim by either a graduate research assistant or a professional transcription service. One researcher verified the accuracy of the transcriptions by spot-checking the

transcriptions against the recordings. The pre-workshop survey and the interview protocol are included as an Appendix.

Additionally, students were asked to keep daily journals documenting their experiences during the workshop and respond to daily writing prompts given to them by the researchers. Journals included students' emotional and cognitive reactions to what they were experiencing in the workshop as well as reflections on the cultural experience and the differences between themselves and the local Botswanans. One student, after keeping a journal during the week, declined to share the journal with the research team. Several students contributed to the journal only superficially. The daily reflective writing prompts were as follows:

1. What have you learned today from a [local]? How did that affect your design process thinking?
2. Describe how someone else was thinking about a concept/issue/idea in a way different than you.
3. What did you find interesting/surprising/intimidating/confusing today?
4. How did you apply your problem-solving skills today?

Limitations of this study included the constrained timeframe and student engagement with the reflective journals. Since the workshop was conducted for a single week, data collection was necessarily restricted to that same week. Regarding the journals and student reflection, commitment to that task varied widely by university and the examples set by the students' faculty mentors.

Data Analysis

A thematic qualitative analysis method was used to analyze the data (Merriam, 2009) and examine the reflections and perceptions of the university students, as presented in their journals and interviews. Students were asked to reflect regarding their challenges, successes, and intellectual or personal growth and achievement throughout the workshop. Using thematic analysis, one researcher unitized the data by dividing textual data into units, meaning any phrase or idea with independent meaning (Merriam, 2009). The researchers then used open coding to generate a code for each unit and grouped the initial codes into common themes or categories using axial coding, consistent with the constant comparative method for identifying themes within the data (Lincoln & Guba, 1985). In the following sections, we present preliminary findings, consisting of the thematic analysis of surveys and journals only, supported by researcher observations.

Findings

The preliminary findings presented here highlight the perceptions of the university students engaged in the workshop. Findings pertain to the expectations and experiences prior to the workshop, including their prior knowledge regarding the rural setting of the workshop and the local community members. We then share the ways in which those

expectations were or were not met during the workshop, and the experiences and perceptions of students during the week.

Expectations and Prior Knowledge and Experience

Before the workshop, students shared their expectations of the experience. Many expectations were closely tied to their prior travel experience; all of the students except one had traveled internationally before, although most had only visited tourist destinations. None of the students had prior knowledge of the people, culture, and context of the Okavango region of Botswana. One MIT student, Jason, had visited the region before on a similar trip but acknowledged he "did not have too much interaction with the local people." Beyond the conflict with elephants, students expressed that they either knew nothing of the local context prior to the workshop, or only what they had read online or what their faculty mentors had shared as part of a pre-trip briefing. All of the students expected to have positive interactions, despite some language differences, with locals at the workshop. Boitumelo expected "a good positive relationship that will encourage knowledge sharing between us and them."

Beyond the interactions with locals, most students expected to have positive interactions with the students from the other universities, although UB students did express some apprehension. For example, Baruti was simultaneously excited and concerned:

> I am a bit nervous about meeting with other university students because they come from good universities and I feel the pressure to step up, but at the same time excited to interact with them, so I anticipate a fun yet scary experience with other university students…. I expect to learn a lot from them. I expect to also learn to interact with overseas students and get to side how life is on the other side of the globe --> to learn if its (sic) as we see in TV.

Other UB students echoed his sentiments, sharing that they were feeling positive and negative forms of anticipation.

Ultimately, the goals of the workshop were most important to the students; they were excited to learn about elephants and animal behaviors in the region, work with members of the local community, and learn about building international partnerships and cooperation. In general, students had realistic expectations of the experience and were open-minded about what they would encounter. Of the 13 students, five included benefits or relationships with the community or locals in their descriptions of what they hoped to accomplish during the week. Selena, from MIT, shared "I hope to come out of this with a new perspective (on what I'm not sure)." Appu, from TAMU, tried to manage his own expectations:

> I planned to accomplish a lot during this trip, but I have been told by those who have participated before on similar events that it is a longer process than anticipated and not to hope for such an expedited solution. The most I can hope

for right now is maybe provide a new innovation from which a sustainable and lasting solution can be derived in the future.

Students from UB were more ambitious and had higher expectations. For example, Jermaine hoped to "come up with the solution that can later change the lives of the community people" and Kopano wanted "to have produced, with the help of other students, a solution to solve the elephant human conflict." These expectations certainly went unrealized.

Reflections During the Workshop

From the analysis of student reflective journals, three themes emerged. Students were surprised by the extent of their own ignorance regarding the local context, surprised and impressed with the local participants in the workshop, and expressed their appreciation of the benefits of the workshop experience.

While most students were aware they did not have a complete understanding of the local context prior to the workshop, they were still surprised by how different the lives and experiences of the farmers and ECOs were from their own lives. In reference to trying to understand problems the farmers face, Jason lamented, "the locals don't quite understand just how ignorant we are about many of the basic aspects of their lives."

Boitumelo described a conversation with a local farmer during a team-building exercise in which groups were asked to build a stand for dried maize using only two sheets of paper; the farmer "raised problem that if the maize is stacked like that, it exposes the corn to cows, chickens, and other small animals in a yard. Hence she suggest[sic] cone like structure that can be closed at the top, which was really amazing to me to get such feedback, as I could not have anticipated [the problem] on my own without her assistance." Similarly, Modise shared the difference between his thinking and that of the group, "even the way I understand the situation was different from the way the farmers…understood the problems. Towards hearing the ideas and thoughts of others, I suddenly realized that my thoughts were out of line with what the actual problem is." Kopano had been very focused on the issue of human-elephant conflict and neglected other important issues. He explained, "we were discussing about how we could solve the elephant problems and while we were working on the most important problems, [we] thought of using chili on the ground such that it will not be carried away. But I did not think about animals like monkeys, which use all their limbs as hands and feed at the same time. They kept reassuring us that even though we are solving the elephant-human conflict we still had to consider other animals, which may become collateral damage." The students were unfamiliar with the local context and relied on the farmers and ECOs for guidance and context.

As a natural extension of their own knowledge deficit, the students were impressed with locals and their knowledge, abilities, and thought processes. Selena elaborated,

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I learned that the locals are much more capable of being creative than I expected. In my psychology classes, I learned about learned helplessness. Although slightly different than this situation, learned helplessness describes the situation in which one gives up trying to escape some form of harm after trying for a certain amount of time. I expected the local people to exhibit similar characteristics due to the fact that they have never had the resources to help themselves. In fact, due to the fact that people often come into their communities with premade technologies, I would have expected them to have learned to become dependent. This was not the case, however. When we were doing the maize lifter activity, I was very impressed with the creativity and effectiveness of the locals' ideas. They were often the architects of the final prototypes.

Caroline shared one instance of the way a farmer was thinking broadly, "when [the farmer] was sawing, I was thinking of how we could build the next part of the project, but she was thinking about how she could use those skills at her farm and in other contexts." Similarly, Kopano noticed that "the farmers are eager to learn new things and would always add more information when you ask any question."

The farmer's interests also stood out for students. Letsego explained, the farmers "wanna[sic] be taught how to make a technologies[sic], not given a technology which they do not understand." Baruti, concurred: "the farmers are able to postpone their daily activities to attend workshops, suggesting that they are willing to learn and grow. This interest in learning manifested itself for Junhee in the presentation of final projects. He explained "my most significant recollection today is the witnessing of the Botswanian villagers sheer enthusiasm when presenting their solutions; I saw in their eyes the reflection of satisfaction, pride, and happiness - the kind of countenance that assures the longevity of the workshop lessons. Whilst it is not enough to know whether the workshop had a long lasting impact, it's satisfying to know they were pleased with the fruits of their physical and intellectual labor."

Appu found the benefit of the experience was a reframing of his perspectives on what it means to help. He gave the example of the group facilitator asking him to "let the [farmers] do most of the work. But that directly goes against everything that I usually do, help out to make the people's life just easier, so a 'not helping is helping' ideology is as foreign as can be." Emily took a more holistic perspective: "the design process workshop has influenced my approach to 'village' problem solving. I feel like the design process perspective is making me think so much harder about how I approach conservation problem solving - finding alternatives to natural resource exploitation in particular."

To summarize the week, Eugenio described his view this way:

> At the conclusion of the event, it was interesting to distinguish the attitudes of the workshop participants comparing between the first day and the last. At first there seemed to be some skepticism and general cluelessness as to what needed to happen, over the days the farmers warmed up and were a lot more active in participation. The last day I could see the excitement in the participants.

In referring to the participants, he included not just the locals but also the students. At the beginning of the week, people were strangers to one another and unsure of how to proceed, how to interact, and what to expect. By the end, friendships were formed, designs were constructed into physical reality, and the foundations of cross-cultural respect and collaboration were laid.

Discussion, Conclusions, and Recommendations

Key successes of the workshop included: (a) students from universities interacting with rural, local populations, including the constraints that such contexts apply to problem-solving, (b) rural populations being exposed to the kinds of design and thought processes that are usually limited to university or corporate settings, (c) adult education principles and practices at work with the empowerment of communities and individuals at the core of the initiative.

Perhaps surprisingly so, the students from TAMU, MIT, and SU seemed to be more pragmatic about what could be accomplished as a result of the weeklong workshop. Students from UB had higher expectations of the work for the week, solving the conflict rather than mitigating or diminishing it, and seemed less interested in engaging with the local participants than with the other university students. This could be related to their shared national origins or class difference between rural populations and those groups with access to university education.

Positive results of the workshop experience for students include their revised view of local farmers as knowledgeable and capable, despite some small language barriers. Challenges that remain to be resolved include the balance of power among the various stakeholders organizing the workshop and the balance of quality experience between local participants and university student participants.

As we evolve and further improve the preliminary results of the study presented here, we wish to better inform community and non-formal education for adults in developing regions. Programs designed to target sustainable development and conservation, and mitigate conflict of all types, would be well-served to consider the ways in which local knowledge and solutions are incorporated into the problem-solving process. For those seeking innovative practices and approaches to create more inclusive and participatory community development programs, particularly in underserved or rural areas, the partnership of students with members of the local community and other stakeholders was particularly successful. Future research certainly needs to include the community

members as study participants. Follow up should occur not only with the 13 university students but also with the community members to discern what, if any, outcomes or changes to farming or elephant interactions were the result of this workshop.

References

Center on Conflict and Development. (2016). *About us*. Retrieved from: http://condevcenter.org/about-us/

D-Lab. (2016). *About D-Lab.* Retrieved from: https://d-lab.mit.edu/about

Ecoexist. (2016). *Our respons*e. Retrieved from http://www.ecoexistproject.org/response/

Ferguson, J. L., Makarem S. C., & Jones, R. E. (2016). Using a class blog for student experiential learning Reflection in business courses. *Journal of Education for Business, 91*(1), 1-10. doi:10.1080/08832323.2015.1108279

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Englewood Cliffs, NJ: Prentice Hall.

Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (1999). *Experiential learning: Previous research and new directions*. Retrieved from http://learningfromexperience.com/media/2010/08/experiential-learning-theory.pdf

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.

Maslow, A. H. (1943). A theory of human motivation, *Psychological Review, 50*(4), 370-396. doi: 10.1037/h0054346

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation* (3rd ed.). San Francisco, CA: Jossey-Bass.

Zarestky, J. (2013). Reflective writing in unexpected places: Implications for student motivation and intellectual development. In C. J. Boden-McGill & K. P. King (Eds.), *Developing and sustaining adult learners* (pp. 69-82). Charlotte, NC: Information Age Publishing.