

## LISA International Education and Research Initiatives

**OVERVIEW** Employers, clients, and former students praise Virginia Tech’s statistical consulting and collaboration center (LISA) as the most critical element for training professional statisticians. Many of these same employers are deploying LISA alumni to address various statistical problems throughout the world. LISA sees opportunities to improve statistics education and expand the global impact of statistics by involving students in international research projects, educational exchange programs, and building statistics capacity at universities in other countries.

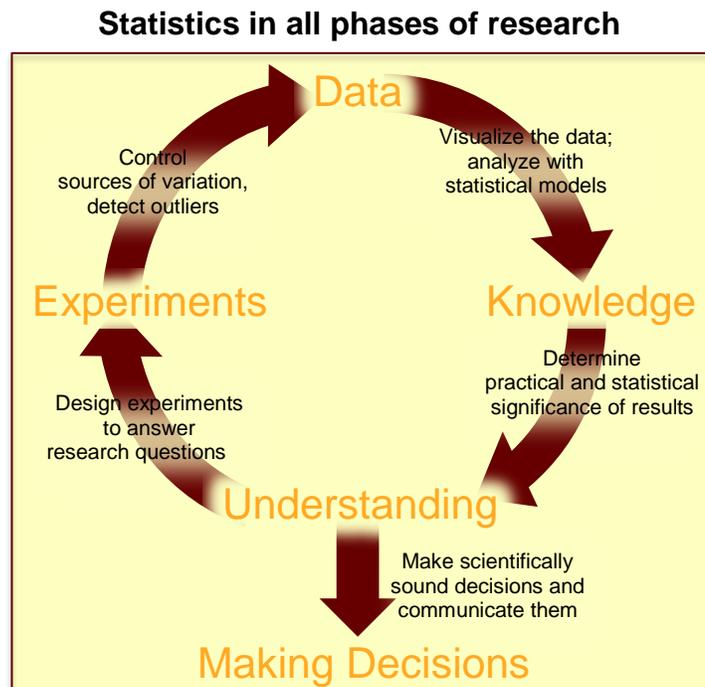
### BACKGROUND

The Laboratory for Interdisciplinary Statistical Analysis at Virginia Tech (LISA) was originally created in 1948 as part of the Virginia Agricultural Experiment Station to help agricultural researchers design experiments and analyze data. LISA now helps Virginia Tech faculty, staff, students, and affiliated researchers in many disciplines apply statistics in all phases of their research—from designing studies and experiments to collecting, analyzing, and interpreting data to make scientifically sound decisions.

**LISA’s mission is to train statisticians to become interdisciplinary collaborators and promote the value of statistical thinking in all phases of scientific research.**

We provide statistical advice, analysis, and education to Virginia Tech researchers by offering individual collaboration meetings, walk-in consulting, educational short courses, and support for interdisciplinary research projects. During the 2010-11 academic year, the LISA statistical collaborators met with 366 researchers from over 60 departments for collaboration meetings, answered quick statistical questions for 271 visitors during walk-in consulting hours, and taught 497 short course attendees how to apply statistics in their research.

LISA statistical collaborators are faculty and students from the Department of Statistics. LISA has full-time director and assistant director who meet with faculty clients and oversee a team of student collaborators. Associate (BS, MS, and PhD students) and Lead (advanced PhD students) collaborators are trained to help researchers design experiments, analyze and plot data, run statistical software, interpret results, and communicate statistical concepts to non-statisticians. In addition, LISA can leverage the entire statistics faculty for research collaborations on a case-by-case basis.



## ***Three International Education and Research Initiatives***

**VISION 1. ON-THE-GROUND STATISTICIANS:** *LISA graduate students will work on global, data-intensive interdisciplinary research projects as “on-the-ground” statisticians.*

When well-trained field technicians collect data following the exact protocols established in expertly designed studies or experiments, researchers and the statisticians who assist them usually have no trouble analyzing such data or interpreting the results. However, many projects—especially complex projects conducted overseas—do not collect clean data that are immediately analyzable and interpretable. Also, when decisions must be made in the field regarding data collection, it is valuable and often necessary to have a statistician on the field research team to help make those decisions. Such “on-the-ground” statisticians can plan the next cycle of experiments or surveys, oversee the data collection process, perform real-time checks for data accuracy and reliability, and gain understanding of the cultural context of the data. This would be invaluable for subsequent studies, analyses, and the interpretation and presentation of the research conclusions.

LISA aims to provide large, global, interdisciplinary research projects with graduate students engaged as field statisticians. In preparation, these students will work with the research team to analyze previous data and help design the next study or experiment to answer the team’s research questions. While on location, the student will oversee the data collection process and focus on identifying—and then fixing—issues with the data collection or irregularities within the data before they develop into problems. Understanding the context of the study and seeing exactly how the data are collected will be a profound intellectual, educational, and personal experience for the student. Professionally, this experience would radically distinguish a student from his or her peers without such opportunities.

### *Specific Example #1:*

In May 2011, third-year statistics PhD student and LISA lead collaborator Mark Seiss traveled to Mozambique for two and a half months to oversee the data collection for an interdisciplinary research project funded by the Millennium Challenge Corporation. The overall research goals of the project are to evaluate whether installing borewells and handpumps in rural villages without access to clean water is an effective, sustainable development strategy and to assess the project’s various economic, health, and social impacts. Professional surveyors from Mozambique asked 1600 heads of household in 54 villages a series of questions and recorded the responses using handheld PDAs. As the field statistician, Mark was responsible for collecting the data from the survey teams every two days; performing quality checks on the data for outliers, missing values, and systematic errors; and providing feedback to the individual surveyors. By the end of the fieldwork, the number of errors Mark identified went to zero as the surveyors made special efforts to talk to Mark to explain data recording errors they made and values that seemed unusual but were correct. The Millennium Challenge Corporation was so pleased with this process and the initial baseline results that they are proposing an expansion of the study beyond the follow-up study already planned for summer 2013.



*Statistics PhD student Mark Seiss in summer 2011 working in the field in Mozambique*

**VISION 2. STATISTICAL EXCHANGES:** *LISA students will learn to be internationally aware and culturally competent collaborative statisticians by participating in short-term (6-month) student exchanges within a network of statistical collaboration centers.*

Many of our students have never had an international or education abroad experience, an experience many claim to be the most important of their academic careers for developing non-technical skills and cultural awareness. Virginia Tech has partnerships with dozens of universities around the world. LISA will identify partner institutions with strong statistical consulting programs and exchange graduate students with them. The LISA student will work in the partner university's statistical consulting center, and the foreign student will become a LISA lead collaborator. We expect both students will work 20 hours per week helping researchers apply statistics while also taking a few classes and continuing their statistical research. Importantly, both students will learn how the host center provides its clientele with statistical consulting and collaboration services. In addition, the centers will hold monthly videoconferencing meetings to discuss clients and projects and our different ways of helping researchers and solving problems, thereby extending the exchange beyond the principal students to an exchange of methods used by the centers. Through these exchanges, LISA aims to create a network of statistical consulting and collaboration centers.

*Specific Example #2:*

Amy Tillman is a first-year PhD student in the Department of Statistics. She would love the opportunity to travel overseas as part of her statistics education. Last semester Amy worked as a LISA Associate collaborator and met with five collaboration clients. After one more semester working as an associate in LISA, Amy might be ready to become a Lead collaborator. As a lead, Amy would meet with approximately 20 clients on collaborative projects and 25 walk-in consulting visitors. At the beginning of her third year in the program, Amy would be a fully trained lead collaborator. She could then confidently study abroad at, for example, the University of Kent in Canterbury, UK while working as a statistical consultant at their Statistics Desk. In England, Amy would have the opportunity to take courses not offered at Virginia Tech, experience new types of

clients and projects, explore a different culture of statistical consulting, and bring home new methods, techniques, and personal and professional experiences to share.

**VISION 3. CAPACITY BUILDING:** *Establish statistical consulting and collaboration centers at universities in countries lacking infrastructure to assist researchers with statistics.*

LISA was created because of the need of Virginia's Agriculture Experiment Station to provide agricultural researchers assistance in designing experiments and analyzing data to improve agricultural practices around the state and the country. LISA still retains this core land grant university value of service to society and aims to help establish statistical consulting and collaboration centers at universities in developing countries, especially those focused on agriculture—such as the University of Juba in South Sudan—and at universities in developed countries such as the Technical University Darmstadt in Germany, which has a robust research profile but does not have a statistics department or consulting center. LISA-trained statisticians in these new statistical laboratories could provide needed statistical expertise to local engineers, scientists, extension agents, farmers, and small-business owners. Data could be collected from well-planned experiments and subsequently analyzed and interpreted using the most effective statistical methods to generate overall improvements in quality and technical advances. This vision will be challenging to implement, but might have the most impact in preparing students for careers in statistics and promoting the use of statistics and statistical thinking around the world from academia to industry, government, and beyond.

*Specific Example #3:*

In 2012, Statistician Awe Olushina Olawale from Obafemi Awolowo University in Nigeria published an article in the [Journal of Education and Practice](#) about the need for young African statisticians to be trained in statistical consulting and for universities across Africa to establish statistical consulting centers. In his article, **Olawale cites LISA as the model statistical collaboration lab that African universities should follow.** LISA is currently writing a proposal to the MacArthur Foundation to fund a site visit and feasibility study of helping faculty, students, and administrators at the University of Ibadan, Ahmadu Bello University, and Obafemi Awolowo University build statistics capacity in Nigeria by starting statistical collaboration centers. One idea is for Virginia Tech and LISA to host a masters or PhD-level statistician from Nigeria for three months to two years—depending on their technical expertise—and train them in statistics communication and collaboration as they gain experience working as a LISA lead collaborator. Once trained, the student could return to the home country to open a mini-LISA at his or her university. To support the creation and sustainability of the new statistical collaboration center, one or more LISA collaborators could visit, on a revolving basis, the mini-LISA for 6 months to help run the lab and spread the proper use of statistics. In subsequent years, LISA could train additional statisticians to help grow the newly created centers or to establish new ones.

For more information regarding LISA or its international vision and initiatives, please contact LISA's director, Dr. Eric Vance, at [ervance@vt.edu](mailto:ervance@vt.edu) or visit our website.