Bridging the Gap between Cultures and Disciplines: Practicum Outreach Program Abroad

Victor H. Mucino, WVU; Dr. Wondowssen Gebreyes, OSU
Dr. William Brustein, WVU; Moderator
WVU’s Industrial Outreach Program in Mexico

1) It involves students from several disciplines (engineering & humanities).
2) Address the “Global Competencies” of graduates
3) It bridges the gap between academia and industry
4) It bridges the gap between students, professional practitioners, faculty members, researchers and communities of Mexico and the USA
5) Produce world-class competitive graduates and future leaders

Ohio State’s Global One Health initiative

1) Prevention and control of (re)-emerging zoonotic infectious diseases;
2) Collaborative approaches to prevent, detect and respond to antimicrobial resistance;
3) Development and testing of rapid, point-of-care, field-deployable detection systems;
4) Evaluation of environmental risk factors that impact agricultural food systems, chronic diseases (such as cancer) and other economic and health outcomes;
5) Development of efficient digital and virtual systems for high impact translational research, training and outreach.
Why? • Global professional competitiveness requires bridges across disciplines and cultures

Who? • Students, practitioners, faculty (engineering, social sciences, health sciences, agriculture etc.)

When? • Really any time, but for example, summer with 8 to 10 weeks (to not interfere with regular semesters)

Where? • Queretaro; a model City with: Major universities, major industries, major research centers, vibrant cultural life, adequate infrastructure

How? That’s what this session is all about…!!

What? : Bridge the Gap; Academia-Industry, USA-Mexico
Why? : Global Professional Competitiveness
The Players: students and faculty from:

Local Institutions in Queretaro
- Universidad de Queretaro
- Universidad Politecnica de Santa Rosa
- UNAQ
- CIENCIA TECNICA
- Tecnologico de Monterrey
- Universidad Tecnologica de Queretaro
- Universidad Politecnica de Queretaro
- UPQ
- Cicata

USA Institutions Involved
- Tor Vergata University
- University of Nevada, Las Vegas
- University of Texas, Austin
- Clemson University
- Purdue University
- Universidad Politecnica de Santa Rosa
- University of West Florida

West Virginia University
Mr. Raul Iturralde Olvera, Director of CONCyTEQ. Supports Program, provides logistic support, communications, liaison with industry, research centers and local universities.

Dr. Victor H. Mucino is a Professor of Mechanical and Aerospace Engineering at WVU. He is also the director and founder of the IOPM at WVU. Conducts the day-to-day operations of the Program.

Prof. Shaila Alvarez Junco is a Professor in the College of Philosophy at Universidad Autonoma de Queretaro and instructor of the Course “Cultures of Mexico” for the IOPM Students from the USA and advisor to the IOPM.

Dr. Angel Tuninetti, Professor and Chairman of the World Languages, Literature and Linguistics at WVU. Oversight of the FCLT 260 Cultures of Mexico transfer course from UAQ and Advisor to the IOPM.
INDUSTRIAL OUTREACH PROGRAM IN MEXICO
PROGRAMA BICULTURAL DE ALCANCE INDUSTRIAL

Spring Semester at WVU
January 1-May 15

10 Students from Queretaro Institutions
Spend spring semester at WVU

Industrial Outreach Program in Mexico
June 1 – July 31

CASE NEW HOLLAND
Agricultural Tractors

TREMEC
Automotive Transmissions

MESSIER SERVICES
Landing Gears Systems

GENERAL ELECTRIC
Airplane Engines, Power Plant Turbines

CENAM
Calibration systems design and testing

CONDUMEX-CIDECE
Superconductors, Electrical Cables

MAEBE
Appliances; ranges, washers, refrigerators

BOMBARDIER
Aircraft Manufacturing Systems

10 new students from Queretaro, UAQ, ITQ, UTEQ, UNAQ join program 1st time

Graduates from WVU and Queretaro
Finish their BS Degree (with distinction)

Graduates from WVU and Queretaro
join industry or enter a Graduate Program due to added competitiveness

Competitive selection process

Subsequent year
Mexican Students at WVU, Spring 2018

Just like in the previous five years, a very select group of four (4) Mexican students from three (3) major universities in Querétaro (UAQ, ITQ and UNAQ) spent the spring semester of 2018 at WVU, conducting a one semester study-abroad. These students carried a full academic load of four (4) regular courses of the Junior/Senior Year (3rd/4th year) plus the involvement in an undergraduate research student project. Students were highly motivated to deliver top performance in all their classes and were encouraged to contribute significantly to each research project they were assigned. This cohort of Mexican students traveled back to Mexico to join the group of six (6) students from WVU, who participated in the summer Program in Querétaro. Ten (10) additional students from local universities joined the summer activity producing twelve (12) intermixed teams of two (2) to three (3) students per team, who worked on seven (7) industrial sites. These projects are briefly described next.
Objectives of the Program

• To add value to student’s education through international experiential learning.

• To solve meaningful engineering problems of value to industry.

• To bridge the gap between academia and industry in the USA and Mexico.

• USA and Latin America need People’s Bridges across cultures more than ever.
Address Global Competencies

Globally competent engineer:
- Is one who is capable of working effectively with people who define problems differently.

Global competencies:
- The ability of working effectively in teams with people of different backgrounds and disciplines.
- The ability of effective communication in spite of language and cultural barriers.
- Cultural adaptability and sensitivity in the work and social environment.
- The ability to anticipate and manage cultural issues that may affect professional activity.
- Understanding and appreciation of role of the profession in a societal and professional context.
Students are placed in home-stay with local families in a well-established residential area of Queretaro (Col. Alamos 2a. Sec.) The families provide safe, healthy, comfortable and friendly family environment for the students, who are in close proximity to each other all the time. Homes are conveniently located near shopping areas, recreational parks, convenience stores, and just a few minutes from the colonial downtown area of Queretaro. Room and board includes meals and cleaning service for the duration of the stay.

Students are also provided with daily transportation to and from their home to the workplace (typically a 15 to 30 minute commute) using vehicles provided by the host institution, CONCyTEQ, and a local university, UNAQ. A typical weekday starts at 7:30 outside their homes in order to be at the industrial site by 8:00 am. The return commute starts at 5:00 pm. On Saturdays a culture class is offered by the University of Queretaro followed by a field trip to parks, museums, towns and villages nearby. On Sundays we rest.
Just like in the previous five years, a very selected group of ten Mexican students from the 4 major universities in Queretaro (UAQ, ITQ, UNAQ and UPQ) spent the spring semester of 2017 at WVU, conducting a one semester study-abroad. These students carried a full academic load of 4 regular courses of the Junior/Senior Year (3rd/4th year) plus the involvement in an undergraduate research student project. Students were highly motivated to deliver top performance in all their classes and were encouraged to contribute significantly to each research project they were assigned. This cohort of Mexican students traveled back to Mexico to join the group of 21 students from WVU, who participated in the summer program in Queretaro. Ten additional students from local universities joined the summer activity producing 12 intermixed teams of 3 to 4 students per team, who worked on 12 industrial sites. The 12 projects are briefly described next.
1. Team CIDE-ConduMex. High voltage cable is a complex system consisting of a composite structure of copper core, semiconductor materials and an aluminum shield. Production of this type of cable requires the determination of mechanical bending properties for both manufacturing, and coiling the cable on the wooden reels. The bending properties of cable can be determined both experimentally and analytically to fine-tune manufacturing process parameters required to render the quality requirements. The student group developed a finite element model to predict the key bending properties of the cable.

2. Team CIDESI. Worked on a collaborative project with various centers focused on developing the preliminary design for the new San Martin, Optical Telescope, scheduled to be operational in 2023 in Baja California. Specifically, the team was tasked with designing, analyzing, and proposing a retractable mirror cover system, safety locking pins, brakes and additional components for the telescope. The student team conceptualized, modeled and analyzed these components for design feasibility purposes and produced simulations of their performance.
11. Team Grupo Mess. The Grupo Mess team was assigned the task of improving a gear testing system. This system is used to test the amount of chatter that occurs on gear shafts. The team is attempting to reduce the chatter by constructing a mechanism that better clamps down onto the gear. The team was also concerned with the time tests typically take, in order to reduce it in future testing. This was accomplished through the design of a testing fixture.

12. Team Safran-Aerospace. This team was asked to identify the possible causes of crack formation on a landing gear components during a routine maintenance and inspection performed at the company. In the process, this team focused on the tools used in the service process to ensure that components are not damaged during the repair process. Finite element models and experimental tests were conducted to identify improvements in the tools used.
FCLT 260 Cultures of Mexico Class. An equivalent of this 3 credit course is taught by the Autonomous University of Queretaro with Prof. Shaila Alvarez who has developed an outstanding course for this program with oversight by Dr. Angel Tuninetti of WVU. The course is offered on Saturdays from 9:00 to 12:00 at the UAQ Downtown Campus, and is followed by field trips to archeological sites, museums, parks, villages and markets. In this course students learn about language, traditions, history and culture, including gastronomy, folklore and cultural sightseeing. The City of Queretaro also offers outstanding cultural opportunities during the summer. The International Jazz Festival in the Summer is a tradition, free of charge in the he main plazas of colonial downtown. The festival “Iberica Contemporanea” is another summer cultural event free of charge. The journey ends with a long weekend in Cancun and the Maya Riviera.
HEAT TRANSFER AND CONSTRULITA

TEAM MEMBERS
Jest-Alejandro Salorio C., UAIQ
Youssef Abboud, WVU
Dylan Vanhorn, WVU

ADVISORS
1. Rafael Alvarado, José Enriquez
2. Gonzalo Marías Bobadilla, UAIQ
3. Víctor H. Muciño, WVU

METHODS AND MATERIALS
- Subsurface Thermal Analysis: The thermal analysis simulation model supports the simulation of heat transfer.
- Cataloging: The cataloging process was conducted to create a catalogue of the drawings to be used in the project.

RESULTS
- Construlita Team was able to create a successful thermal analysis model to be used in the future of the company.
- The model allowed them to develop new designed heat sinks. The heat sink achieved a base temperature of 88.6 degrees Celsius.
- The thermal model was also applied to the existing system to reduce costs and improve performance.

REFERENCES
1. Table of Total Emissivity, Ortega.
3. www.construlita.com/eng/
5. Paul M.
6. www.construlita.com/eng/
7. www.muce.com

CONCLUSIONS
- SubSurface Thermal Analysis simulations prove to be an accurate tool in assessing heat transfer.
- Construlita Team was able to propose viable options for new heat sinks.
- Team was able to redesign and create a new prototype to be tested in 2017 for use in cutting.

Pictures
- Simulation of a whole system with the thermal model.
- Comparison: ICLED model vs New design.
Renewal of WVU-CONCyTEQ Agreement

A major event took place this year, with the visit of Dr. William Brustein, WVU Vice-President for Global Strategies and International Affairs and Dr. Gene Cientlo, Dean of the College of Engineering and Mineral Resources at WVU, who visited Queretaro to sign the renewal of the Agreement between WVU and CONCyTEQ (Council for Science and Technology of the State of Queretaro) for a period of five (5) years. The Signature Ceremony took place at the Secretariat of Education of the State of Queretaro on July 19, 2018. The Ceremony was presided by Lic. Alfredo Botello, Secretary of Education for the State of Queretaro and by Mtro. Raúl Iturralde Olivera, the Director of CONCyTEQ. The event was covered and reported in the local networks and newspapers of Queretaro.

https://industrialoutreachmexico.wvu.edu/mini-reports-project-posters
# 22 Year Summary IOPM - 2018

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* Research Centers
** From West Virginia
Wondwossen Gebreyes, DVM, PhD, Diplomate ACVPM

Executive Director
Ohio State Global One Health
College of Veterinary Medicine
Department of Veterinary Preventive Medicine and Office of International Affairs
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https://vet.osu.edu/about-us/people/wondwossen-gebreyes

Area of expertise: Veterinary Preventive Medicine Infectious Diseases

Gebreyes' professional expertise lies in the area of global health and infectious zoonotic diseases. His team conducts research on globally important zoonotic and foodborne diseases of public health significance with a major emphasis on antimicrobial resistance. In the One Health Ethiopia project, he directs the overall program as well as teaches molecular epidemiology of infectious diseases. In addition, he is the core team leader for rabies prevention and control project and co-PI on rapid diagnostics of bovine TB project activities.

Projects:
CDC - Global Health Security
International Congress on Pathogens at the Human Animal Interface
One Health Summer Institute
Curriculum Twinning
About One Health

GLOBAL ONE HEALTH

The Global One Health Initiative connects Ohio State to Ethiopia, Kenya, Tanzania, Mexico, Brazil, Thailand, China, India and beyond in a coordinated, multidisciplinary approach to improve health, build capacity, and provide learning opportunities for students across the globe. Initiated in 2009, the program expanded in 2012 to include Ohio State’s seven health sciences colleges as well as the colleges of agriculture, arts and sciences, business, education and human ecology, engineering and social work. Today hundreds of Ohio State students, faculty and staff are involved in the initiative, building capacity within cross-cutting issues including zoonotic diseases (such as Rabies, Anthrax and Brucellosis), antimicrobial resistance, cancer, maternal and child health, medicinal plants, food safety and curriculum twinning, and sharing information through innovative e-learning technology. The Global One Health Initiative is the university’s largest, interdisciplinary example of institutional teamwork operating on a global scale.

A One Health approach brings together multiple disciplines working locally, nationally and globally to address the spread of disease, promote health and emphasize the connection among humans, animals and the environment. Over 70 percent of emerging infectious diseases are zoonotic (e.g. they originate in animals, but can mutate and spillover into the human population, like Ebola.) Every four months a new infectious zoonotic disease emerges and fewer than 20 percent of countries are equipped and able to respond quickly. This is why an integrated One Health approach is critical to help predict and prevent the next outbreak of disease.
CDC - Global Health Security

Working with partners in Ethiopia, Ohio State is finding ways to prevent and control priority zoonotic diseases (currently Rabies and Brucella) and prevent antimicrobial resistance in Ethiopia. Through the Ohio State-Eastern Africa Global One Health Security project, Ohio State along with the Centers for Disease Control and Prevention (CDC), and partner institutions in Eastern Africa, are working together to help the Ethiopian government establish and expand systems, policies and practices for prevention, detection and build capacity.

Zoonotic diseases present a significant threat to the health and livelihood of Ethiopians. The human suffering and loss of life due to these diseases is devastating; the impact on livestock compounds the problem through decreased productivity and mortality, which further compromise food safety and security. Ohio State’s strategy to prevent zoonotic diseases includes:

- Improve public and animal health surveillance and reporting of zoonotic pathogens by focusing on the five priority diseases: rabies, anthrax, brucellosis, leptospirosis and echinococcosis.
- Decrease zoonotic disease burden of the top priority organisms in Ethiopia by implementing One Health educational awareness campaigns.

Rabies prevention and control

With a roadmap document jointly developed by Ethiopian partners, Ohio State and the CDC, the project is anchored on four major areas:

- Surveillance and monitoring
- Prevention in animals; mass vaccination and population control
- Prevention in humans; provision of post-exposure prophylaxis
- Education and advocacy

Brucellosis prevention and control
International Congress on Pathogens at the Human Animal Interface

The International Congress on Pathogens at the Human Animal Interface (ICOPHAI) is composed of scientists and policy-makers from Brazil, the United States, Ethiopia, Kenya, Thailand, and many other countries in South America, Asia, Africa, and Europe. ICOPHAI brings One Health world experts together biannually to accelerate the global capacity and knowledge sharing to effectively reduce the burden of infectious and non-communicable diseases, environmental hazards, and their risk factors using the “One Health” platform.

ICOPHAI aims to strengthen leadership to integrate professionals from different areas and regions. The inaugural ICOPHAI congress was held at the United Nations Conference Center (UNC) in Addis Ababa, Ethiopia, in 2011, followed by the 2nd in Porto de Galinhas, Brazil (2013), the 3rd in Chiang-Mai, Thailand (2015) and the 4th in Doha, Qatar (2017).

The ICOPHAI Congress focuses on interdisciplinary knowledge-sharing platforms to address research, capacity building and policy developments that ensure and promote safety of food and water; prevention of vectors, and mitigation of environmental hazards. It promotes the positive benefits of international trade, tourism, other livelihood and economic benefits.

The 5th biannual ICOPHAI will be Canada. More details to come soon.
One Health Summer Institute

The annual One Health Summer Institute involves faculty from Ohio State and regional partners delivering modular trainings, interactive workshops, didactic trainings and applied learning opportunities to build One Health capacity among Ohio State students and eastern Africa professionals.

The Institute is supported through donor funds, federal grant funding, Ethiopian partners funding and in-kind donations and involves faculty and staff from across the university, including faculty from 30 different departments with very diverse expertise.

OHSI is a keystone project to Global One Health Initiative’s capacity building among Ohio State undergraduates, graduate, professional students, faculty and post-doctoral fellows. It provides the Ohio State community with opportunities for hands-on training in research, animal care, One Health techniques and laboratory methods. In addition, the Institute has expanded Ohio State's presence in the region and created opportunities for pursuing other sponsored programs with regional partners.

The eighth annual One Health Summer Institute will take place May - August, 2019 in Ethiopia and Kenya and will offer diverse One Health opportunities including trainings on One Health communications strategies, international trade and risk analysis, molecular epidemiology of infectious diseases and study design and sample size estimation. Review this year's training descriptions.
Curriculum Twinning

Disease that can quickly spread across continents due to current trade and travel abilities have made early detection and diagnosis of major pathogens ever so important. Any major disease that threatens one country is a danger to the global community, and only early detection and rapid treatments can control and contain the threat.

As a result, those being trained in the human and animal health sectors should be learning from similar curriculums that will train physicians and veterinarians to be proficient starting on day one after completing their education.

To improve education and training, the Global One Health initiative has partnered with the College of Veterinary Medicine to develop the Curriculum Twinning Program, a three-year project in which faculty from Ohio State and the University of Gondar in Ethiopia have identified curricular targets and outlined methods for enhancing institutional capacity and expertise in veterinary medicine in Ethiopia.
Projects for our One Health partnerships are broken down into four distinct yet interconnecting areas:

- Research
- Outreach
- Education
- Resource Stewardship

For example, the Ohio State/Ethiopia One Health Partnership consists of a series of projects aimed at advancing the health of Ethiopians and providing valuable service learning opportunities to the Ohio State partners. The projects fall into the above four categories.

**Communications**

Public universities in Ethiopia are achieving successes following significant government investment in higher education. However...

Read more

**Medicinal Plants**

The World Health Organization estimates that up to 80% of the population of Africa makes use of traditional medicine in sub-Saharan Africa...

Read more

**iTunes U**

Check out the iTunes U public courses developed by Ohio State One Health Task Force members.

Read more
NIH East Africa eCapacity

Bridging the Gap in Electronic Capacity in One Health

Interaction between and among humans, animals and the ecosystem has created an optimum condition for emergence and dissemination of zoonotic, vector and foodborne pathogens. It is reported that every four months a new infectious disease emerges, and about 75 percent of these diseases are zoonotic. Agricultural practices, urbanization, climate change and associated environmental hazards pose a major challenge to public health and zoonotic diseases - as well as the increasing chronic diseases - and have a significant impact on society. Developing regions, particularly sub-Saharan Africa and Asia, are recognized to be hotspots of newly emerging and reemerging zoonotic infectious diseases, and are facing a surge in non-communicable diseases.

To narrow the gap in scientific knowledge, technology transfer and scientific networking between partners in the United States and eastern Africa, Ohio State is using electronic and digital systems to capture research findings and partner in mutually-beneficial training programs. Goals of the projects include:

- Develop institutional capacity that will enable researchers to gain the expertise needed to implement innovative information communication technology activities, including online teaching/learning opportunities in key global health training areas at the respective partner institutes.
- Develop a tablet computer and mobile phone-based application for research data capture, crowd sourcing and analyses tailored to projects on key areas of infectious diseases at the human, animal and ecosystem interface.
- Provide mentored, targeted practicum for information communication technology project support in the area of infectious diseases at the human, animal and ecosystem interface and establish regular webinars and workshops to strengthen and sustain scientific networking among eastern
WHIP3/TB Challenge Tuberculosis Study

WHIP3/TB Challenge Tuberculosis (TB) study (WHIP3/TB) is a collaborative, clinical trial project with Aurum Institute funded by the U.S. Agency for International Development (USAID) and led by Ohio State’s College of Medicine with support from Global One Health initiative and Office of Sponsored Programs.

The study involves HIV positive participants enrolled in the clinical trial to determine the optimal TB prevention treatment protocols. This project is part of a worldwide initiative led by USAID, Challenge TB, which aims to improve access to high-quality patient-centered services, prevent TB transmission and disease progression and strengthen TB service delivery platforms in order to end the global TB epidemic.

Ohio State is among the top few global institutions involved in this major Challenge TB project, which is highly endorsed by the World Health Organization and is expected to result in a major milestone that impacts TB patient outcomes globally.

Consider these facts (2016):

- An estimated 10.4 million people were newly infected with TB
- 400,000 people with TB/HIV died
- An estimated 1 million children acquired TB
- 170,000 children died from TB
- An estimated 490,000 people developed multidrug-resistant TB (MDR-TB)
- An estimated 250,000 people died from MDR-TB
- Of the estimated 10.4 million new TB cases only 6.3 million were actually diagnosed (61%).
Preguntas

Questions...???