



Panel 1A: International Collaboration

Facilitator: Regina Hannemann (U Kentucky)

Panelists: Reid Bailey (U of Virginia), Lisa Barrager (BYU), Tim Guggisberg (Clemson), Nicole Pitterson - Studying students in South Africa/UK and 3-year tracking of outcomes

Description: This panel will discuss the benefits and challenges of collaboration between institutions in different countries and across time zones. Come learn how to go global!

Different program perspectives: size of student groups (e.g., 16 versus larger or smaller), international clients vs. university, various project locations outside the US; different lengths of time (2 weeks versus 8-month ramp-up and then the in-country experience) and times of year (between semesters vs. over summer), virtual or in-country, faculty mentors (from the international location, from the home university, or a mix)

Clemson/BYU: 100% industry projects, sponsors outside of the US with projects implemented outside of the US (humanitarian)

Key Frameworks: What is the objective of doing an international project? BRING THE PASSION!

Lisa - BYU

- Multidisciplinary programs (a majority of the programs)
- Internationally - the outreach arm is with the Church of Jesus Christ of Latter-Day Saints
- Connection to the church community helps with international project generation-humanitarian projects
- South America, Bolivia, Ecuador
- Partner with a group in country because they can't just send students and faculty to the site. Have to tie to an ongoing effort in the country which ensures buy-in in the community
- Connection to in-country groups typically comes through church connection
- 1 cohort per year - start in September and end in April
- Students would travel the following summer after the team is formed; students have to fund part of their travel; attractive option for foreign-language speaking students
- 55-60 projects run a year, 4 instructors + Lisa (ME) and Counterpart (ECE)
- Students run projects themselves, each project has a coach (adjunct faculty, would travel also)
- Start project at home university (2 semesters) and finish off-site (summer)
- Timeline: in-country happens after graduation, after the last 2-semester of senior year; students sign up for this opportunity knowing that this is the outcome. Students pay \$2500 in January. Students are typically older, with different levels of maturity. The trip is a "bonus," and students are not graded.



Capstone Design CONFERENCE 2024

JUNE 3–5, 2024 ► KNOXVILLE, TENNESSEE

- BYU - Leaders of the club become leaders of capstone or, in one case, faculty selects. 5-6 students on the team; for example, Mars-Rover is a 25-student team; some projects will be 8-9 students in size. The nature of the project depends on what the sponsor wants
- Extra work is involved, but the student experience is worth it

Tim - Clemson

- 4th year running this program
- Happens during summer
- Based on connections, established and otherwise
- First-year started with a faculty member's interest in starting something in Mexico and Tim's connection with Michelin
- 2 projects a summer (5 weeks, replaces second semester), manufacturing-related (Clemson and Technologico de Monteray - ISE and MechE)
- The project takes place virtually, with no international travel
- A student team is 5, 2-3 from each university
- This is an official capstone - they teach the capstone design process in the first semester and the second semester is the project.

Reid - University of Virginia

- Self-funded program, 700 students x \$4,000 fee per student
- 2 weeks-long program, F/T
- On-site from prob definition to implementation
- Getting more applications than slots available
- 16 slots is an ideal size for these types of projects (plus 2 faculty)
- Work with companies, start-ups, governments, etc. in different parts of the world
- The program started in 2009 in Mendoza, Argentina (110-120 projects there have been in the wine industry); the person who started this was an alum who was president of an expat community
- The program started in 2014 in southern Sweden around sustainability
- Dubai, UAE - entrepreneurship
- South Africa - rolling out in January
- All of these happen in a year; 3 of the programs happen in between semesters
- Students learn where they are going in October; partner with the University's international travel office (help with background checks)
- Not all students who participate are engineers, 1/2 are, and the other half are business students, psych, languages, architecture, urban planning
- Teams, faculty that lead, and the program is interdisciplinary
- 2-3 weeks, mainly in January (one is in May)
- The focus is to ensure this is not tourist activity or a glorified field trip - one place, one project, one focus
- Outcome: Build-outs that students can leave with the sponsor, sometimes recommendations
- Critical - in-country partner, doesn't have to be a university
- Connection through international alumni
- 700+ students have done this
- Student prep includes relationship focus and root cultural values, such as reading up on the culture



Capstone Design CONFERENCE 2024

JUNE 3–5, 2024 ► KNOXVILLE, TENNESSEE

- This doesn't officially replace capstone, but is the equivalent of a 1-semester capstone
- If you are interested in this type of model, contact Reid!
- Attendees voice ABET concerns given this short timeline and the ABET requirements. There is a build-element, but prototypes are built, just not physical.
- They haven't partnered with international students.
- Considered international model over a longer period - would start in August but not travel to January or one semester on campus and 2-weeks in-country

Benefits

- 2- way interview for students and sponsors
- Professional development opportunity for sponsor employee
- Engaging with students when they are authentically into the opportunity, excited!
- Seeing the light bulb go off for students that "I can make a difference"

Questions from attendees:

- How are programs/projects funded?
 - U of Virginia - sponsors pay for on-campus projects; not the same expectation for Mendoza or other international clients; students pay for their experience (additional cost to the students, working on getting donors to increase accessibility; \$6500 for the opportunity); the opportunity is free
 - BYU - fee is the same for on-site and in-country; educational grant
 - Clemson - fee is the same for on-site and in-country
- Company-based, but are there internal research projects and competitions?
 - Clemson - does this on-demand, but led by faculty interest
 - BYU - primarily industry-sponsored, 1-2 that are faculty-driven, but has to be scoped/outlined just like an industry project; sponsor has to come up with the money (as does the faculty); club is the primary group leading it, but capstone is a sub-consultant to the club, club scopes the project (club as the client)
- IP?
 - U of Virginia - No agreements, students can do with IP what they want
 - Clemson - Student-created IP if it uses university resources; use template agreements; the company has 120 days to say they want to acquire the rights; if the company wants IP, they pay an additional fee (\$10K and 85% of the fee goes to the students); required to provide students with another option if they don't like how IP is handled; avoids IP in summer projects (manufacturing-related) but before the course starts students sign NDA
 - BYU - varies depending on corporate vs. humanitarian; corporate - IP goes to them; humanitarian - not funded, have to find another party willing to fund the projects, option for students who don't want to sign IP agreement; small outcomes - ignored; bigger outcomes - tech transfer office takes it on; \$22K/project fee and \$1500 goes toward parts; Internationally - in agreement with the project sponsor, the sponsor is in charge of filing the provisional before design expo; students



Capstone Design CONFERENCE 2024

JUNE 3–5, 2024 ► KNOXVILLE, TENNESSEE

- have the right to share the design work in that format; students names get put on the patent but don't profit from it
- Oregon State - asks each sponsor if they have an IP requirement and ask students if they want to maintain IP (advising is provided and they receive a document)
- What does the commitment look like?
 - Virginia - hasn't made an agreement on what the students are going to deliver; do insinuate that the students will be delivering something
 - Clemson - can have an outcome, but then no IP; has multiple teams on the same project (sponsor gets multiple proposals); if the sponsor wants the prototype they can ask for it
 - BYU - takeaway is documentation and prototype and sponsors must buy into this being primarily an educational experience, not work-for-hire due to the grant
- Compilation of student teams re: Nationalities? (e.g., trying to avoid location/language bias)
 - BYU - look at who are the people that will be working in-country. Helps to determine student team make-up; What is going on with the project? Consider all skills needed, not just language skills.
 - Clemson - asks for a level of English from students from Mexico; but the project is done completely in English, though students may interact with employees who speak other languages; Mechlin emphasizes global teams
 - Virginia - no language requirements; Sweden - English is the main language; can have a translator, if needed; values the lessons students learn about information output vs. input
- Program sustainability?
 - Clemson and Virginia, established programs, longevity not dependent on Tim or Reid; a team makes it happen
 - University mechanisms (University travel/international office) must be in place
 - Entity in-country is key so that the project can be taken over and can last/continue to exist (for BYU, an example is a 3-year, multi-stage project in Mongolia); sometimes projects are multi-year/multi-stage
 - Repeat sponsors speak for quality/satisfaction of sponsor experience
 - Various project outcomes - sometimes sponsors don't return and there is no follow-up to know why, or other cases where student communications are ongoing, even after the project is done; other examples where the sponsor has implemented student teams' work and this can be seen years after the project is completed
- How are projects sourced?
 - Virginia - Reid and in-country contact source projects
 - BYU - also has an international studies office to help line up travel and uses in-country contact to help source projects (what is available in-country); will do ordering for students and have materials sent in-country so that it is there, ready when students get there



Capstone Design CONFERENCE 2024

JUNE 3–5, 2024 ► KNOXVILLE, TENNESSEE

Additional Themes to Explore in the Future

- Export Control/data transfer for international projects
- Club/Capstone Relationships
- Establishing/Managing a program fee
- Multiple teams on a single project - pros and cons

Travel: Issue where you've had to pull a student in the middle of a project?

- Having the system/supports in place ahead of time is critical
 - Mental health issues
 - Medical incidents
 - No misbehavior issues

Follow-ups:

- **Share the UW and BYU Sponsorship Agreement with the group.**