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Engineering Learning Community Introduction to Research Abroad A 5 year Assessment

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Engineering Learning Community Introduction to Research Abroad

A 5-year Assessment

Introduction

In 2015, staff and faculty at Texas A&M University (TAMU) partnered with the Yucatan Initiative Project (YIP), to create a program in Yucatan, Mexico where engineering students could develop their global mindset and gain research experience early in their college career, through a high-impact learning opportunity. The Engineering Learning Community Introduction to Research (ELCIR) Program was launched in the spring academic semester of 2015, through the joint efforts of organizations and institutions in Texas and Yucatan:

- Access & Inclusion Program and its Engineering Success Program (tx.ag/TAMUAI)
    - Provides academic and peer support to economically disadvantaged first generation underrepresented minority students
        - Academic success classes and seminars (e.g., study skills and test-taking techniques, resume workshop)
        - A student mentorship program where sophomore, junior, and senior peer volunteers are assigned to Regents' Scholars to meet with them throughout the semester and provide encouragement, advice, and support
        - National and state-wide scholarships to further support students' education and on-time graduation
        - Professional development and industries mentorship

- Halliburton Engineering Global Programs (HEGP, engineering.tamu.edu/academics/global/index.html)
    - Develops and Implements global programs for engineering students to prepare them to lead in the global industry and society at TAMU's College of Engineering

- The Louis Stokes Alliance for Minority Programs (LSAMP, tamuslsamp.org)
    - A NSF-funded program that provides monetary support for STEM students who identify as African American/Black, Hispanic/Latino, American Indian/Native American, Native Hawaiian, and Native Pacific Islander
        - Funds Regents' Scholars' ELCIR expenses

- Yucatan Initiative Project (YIP, yucatan-initiative.tamu.edu)
    - A collaborative platform for research, academics, and service between Texas and Yucatan, Mexico

The ELCIR Program was led by both the Access and Inclusion and Halliburton Engineering Global Programs; with, its logistical programming managed by HEGP. The program is open to all freshman students at the College of Engineering. Through the NSF LSAMP funding, Regents' Scholars, a cohort of students managed by Access & Inclusion, received financial support to participate in ELCIR fully funded. ELCIR students travel to Yucatan to experience a research-based program at partner universities that are part of the YIP and its partnerships in the Yucatan Research Consortium (SIIDETEY).

Yearly editions of ELCIR took place from 2015 to 2019. The 2020 and 2021 were canceled due to the Covid-19 pandemic. Even though there were program adjustments from year to year to improve the program quality and impact, the original program goals remained: to increase retention and graduation rates by developing a learning community focused on a

research experience early in their academic programs (the program takes place between the first and second academic year); develop students' global/cultural competence; and encourage students to pursue research-related opportunities after graduation. On this paper, we present the assessment of this program from 2015 to 2019.

While LSAMP funding enables the Regents' Scholars to participate at a minimum cost, all engineering freshmen and sophomores are encouraged to partake in this unique learning experience. The ELCIR Program aims to positively impact students (e.g., increase global competence, self-confidence) through a program that begins the spring semester prior to their research trip in May. During this semester, students participate in workshops where they learn about the Yucatan region (which extends to the whole Yucatan Peninsula), expectations of the program, develop their awareness of global competency, and receive travel/security orientations. After spring semester classes end, students travel to Yucatan for two weeks, where they take an "Introduction to Research" course taught by faculty members from TAMU with participation from the faculty members of the host university in Yucatan. In 2015 Anahuac Mayab University was the host; in 2016 the program host became Marista University, and in 2017, the program grew to include the Polytechnic University of Yucatan as a second host institution.

Professors at each host institution introduced students to the scientific method based on YIP's vision, which accounts for solving regional problems present in both the states of Texas and Yucatan (e.g., coastal erosion, energy development, climate variability, early warning systems, nutrition, food security). Students were required to submit deliverables along the course development, focused in the definition of a research proposal. Students drafted a regional research problem they wanted to address, which they experimented with during their time in Yucatan. Since the aim was to produce a research proposal, all steps to produce it were discussed, starting with a literature review, definition of theories and methods to address their problem of interest, defining an experimental design, putting together a proposed team, infrastructure, a budget, etc. The ELCIR course culminated with the submission of the proposal document and with its presentation through a poster presentation session. It is worth mentioning that the definition of the student's research regional problem was based on hands-on interactions at half a dozen research institutions which students visited during their stay in Yucatan. An abbreviated version of the ELCIR class syllabus is given in the Appendix.

While in Yucatan, students are encouraged to consider the social impacts of their research topic. This is bolstered by the connections they established in Yucatan, both with the people and environment. Starting in 2016, students stayed with a host family and participated in cultural group activities, including visits to Yucatan's capital Mérida, archeological zones like Uxmal and Chichén Itzá, environmental protected areas like Sisal's mangroves, historic industrial sites like henequen haciendas, and karstic formations like cenotes and Loltun's caves, among others. The result of this experience is a well-rounded research and STEM-based cultural journey that begets students with higher confidence levels, cultural competence, and an understanding of the importance of applied research.

Data & Methods

ELCIR participants were tracked through their college career to determine if ELCIR impacted their graduation and retention rates. An ancillary goal of the program is for students to pursue a graduate degree or apply to graduate school due to early research exposure (i.e., in their freshman year). Graduation and retention rates were accessed for the cohorts each semester and

were obtained from TAMU's *Office of the Vice Chancellor and Dean*. Based on the Unique Number Identification (UIN) of enrolled students and their consent, we were able access all students retention and GPA. Students were also provided a pre- and post-survey to determine changes to research skills or cultural knowledge. Table 1 shows the number of students who completed the pre and the post survey.

Data was obtained for each cohort, beginning with the 2015 cohort, which are students who began college in the fall semester of 2014 and participated in ELCIR in the summer of 2015. Data available was gathered for the 2015-2019 cohorts. Due to Covid-19 complications and Covid's impact on global programs world-wide, the experience was not sanctioned for 2020-2021.

Year of Survey	Pre-Survey Participants	Post-Survey Participants	Response Percentage
2015	16	16	100%
2016	43	38	88%
2017	43	17	40%
2018	64	18	28%
2019	41	38	93%

Table 1: Students per year who completed the pre and post-survey

The students

A. Demographics

Students were asked to report their racial/ethnic and sex/gender identification. The ELCIR program attracts a diverse group of students that does not directly match the demographics for the TAMU College of Engineering. Hispanic/Latino students make up the majority of the cohorts (fig. 1) at 72%, followed by White students (10%), Black/African American students (9%), and Asian students (3%).

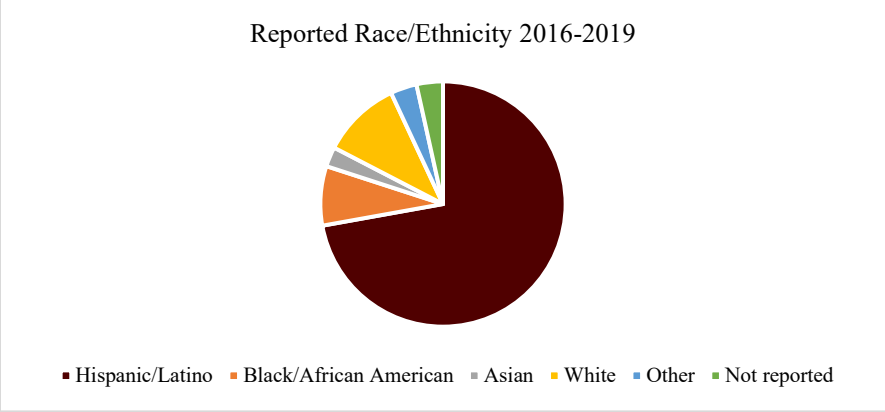

Fig. 1. Race and ethnicity reported by all ELCIR participants 2016-2019.

Hispanic/Latino students may be drawn to the program due to its location and their desire to learn more about their culture or ancestry, as the number of Hispanic/Latino students in the ELCIR program is disproportionately higher than that of the College of Engineering student

body. As of fall 2021, students at the TAMU College of Engineering identified as 45.48% White, 21.68% Hispanic/Latino, 14.12% Asian, and 2.48% Black/African American [1].

The percentage of female engineers who participated in ELCIR was also higher than that of the college's population. Female ELCIR participants composed 48% of the program population (fig. 2). As of fall 2021, only 22% of the student population at TAMU's College of Engineering was female.

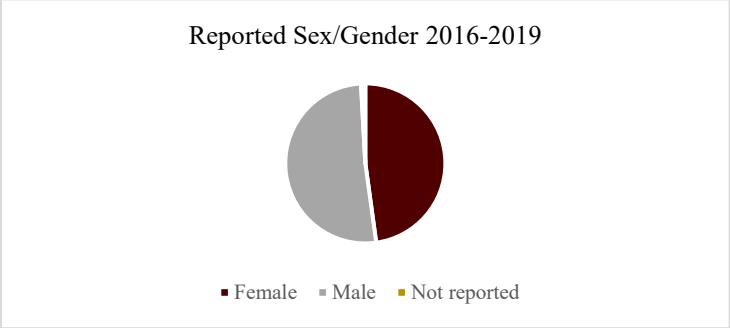

Fig. 2. Sex/gender reported by all ELCIR participants 2016-2019.

B. Graduation and Retention Rates

Graduation and retention rates were obtained for all ELCIR participants and the rest of their cohort, or their peers at Texas A&M's College of Engineering. Retention rates for both groups predictably dropped; however, ELCIR participants were consistently retained at higher rates than their peers.

As used in many large research universities, graduation rates are reported through 6-year graduation [2]. Also, TAMU engineering students are required to graduate with a "high-impact experience", which includes a global program or internship [3]. Of the College of Engineering students in 2018, 2019, and 2020, only 41.7%, 42.9%, and 43.3% had graduated at the 4-year mark, respectively [4]. The College of Engineering's curriculum is 8 credits higher than that of most undergraduate degree plans, which are usually 120 total program hours [5]. This equates to almost 1 additional semester's worth of courses. Put another way, that's almost 3 more courses (one course is worth 3 credits) TAMU engineering students have to take. For the 2015 cohort (fig. 3), ELCIR participants graduated at higher rates than their peers, with 75% total having graduated by 2020 versus 66.8% for all other engineering students.

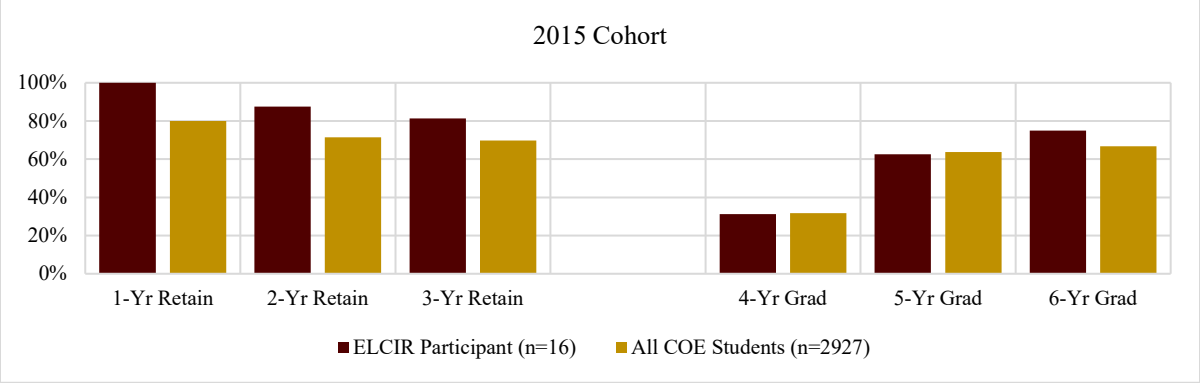

Fig. 3. Graduation and retention rates for 2015 ELCIR participants and their peers.

For the 2016 cohort (fig. 4), graduation rates were only available up to the 5-year graduation point (2020), and at that point, 73.3% of ELCIR participants had graduated, eclipsing their peers' graduation rates by 11%. Neither 2015 cohort neared a 100% graduation rate at the 6-year mark, indicating many have yet to graduate. Considering the 2016 cohort's 5-year graduation rates almost match the rates of the 2015 cohort at the 6-year mark, it's possible to speculate that the 2015 cohort was negatively impacted by COVID-19 and federal, state, and county restrictions mandating the closure of businesses and educational institutions and corresponding *Shelter In Place* Orders [6].

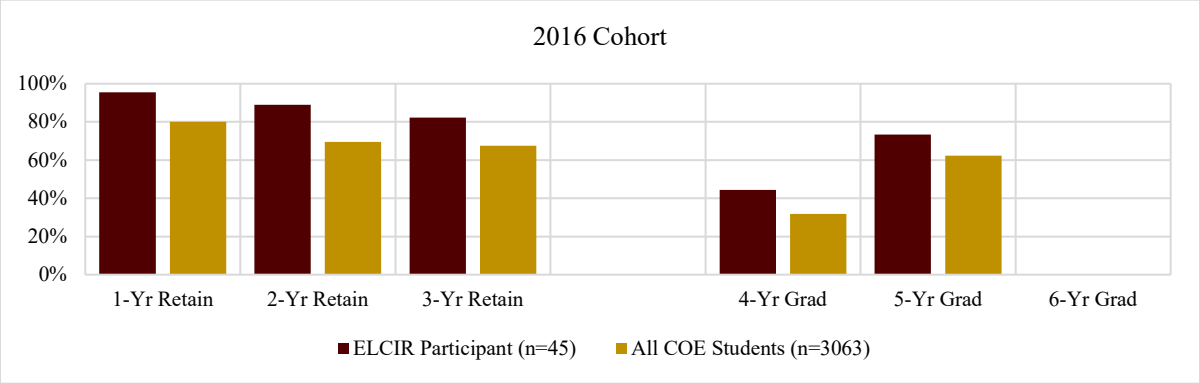

Fig. 4. Graduation and retention rates for 2016 ELCIR participants and their peers.

Retention rates for ELCIR participants continue to present a positive pattern for the 2017, 2018, and 2019 cohorts. When comparing the 2017 cohort to their peers (fig. 5), retention rates for ELCIR participants are, at the minimum, 8.3 percentage points higher, with the highest difference in retention at 11.6 points during the second year.

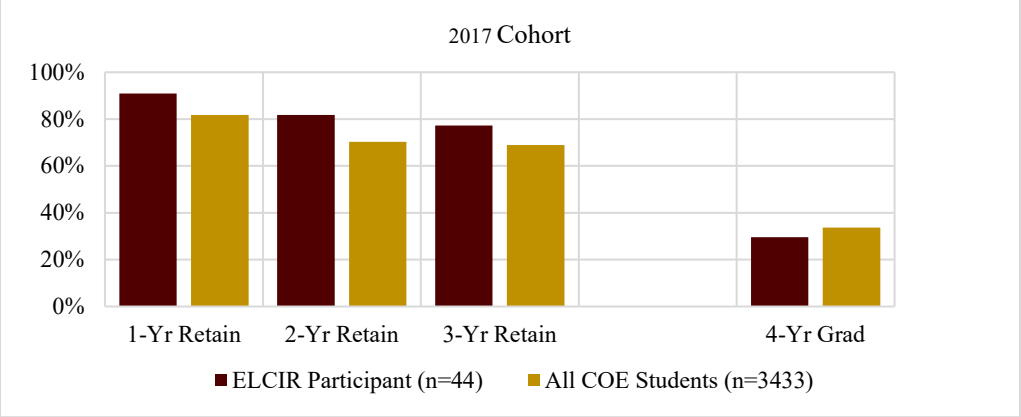

Fig. 5. Graduation and retention rates for 2017 ELCIR participants and their peers.

When comparing the 2018 cohort to their peers (fig. 6), retention rates for ELCIR participants are, at the minimum, 12.2 percentage points higher, with the highest difference in retention at 13.4 points during the first year.

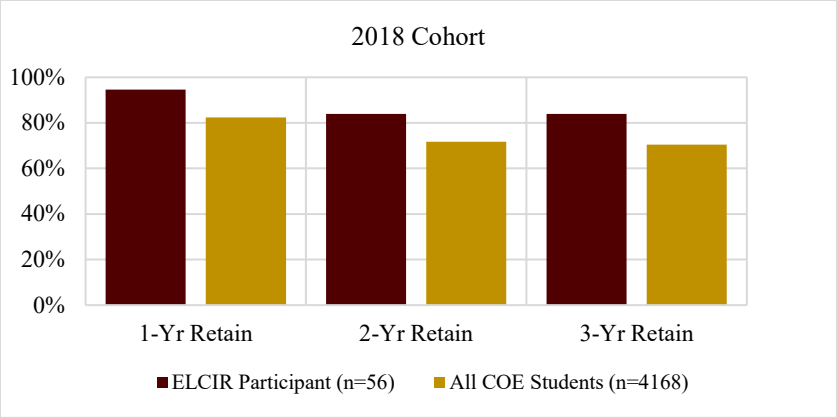

Fig. 6. Graduation and retention rates for 2018 ELCIR participants and their peers.

When comparing the 2019 cohort to their peers (fig. 7), ELCIR participants' retention rates for the first year exceed their peers by 12.6%, and by 8.6% the second year.

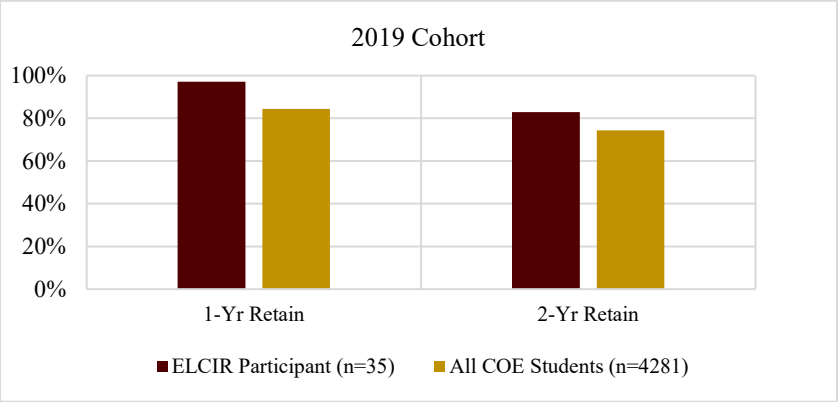

Fig.7. Graduation and retention rates for 2019 ELCIR participants and their peers.

C. ELCIR Pre- and Post-surveys

Following the 2015 program, a survey was provided to the participants before and after their program to measure increases in competence regarding collaboration and teamwork, time management, communication, research knowledge, self-confidence, and personal cultural views. Questions were provided on a 1 to 5 Likert scale (strongly disagree to strongly agree). While most were expected to increase with the attainment of knowledge, a small amount of the questions expected students to travel downward on the Likert scale (e.g., I constantly need affirmative confirmation about myself from others). While the majority of the survey questions persisted through each year's survey iteration, there were some surveys that changed or removed one question; the question that was changed or removed was not consistent. This minor change may have affected calculations of which questions dependably increased or decreased per year, as there may have been a year where the question was not asked. Table I highlights which of the questions increased in at least 3 of the 4 cohorts' questionnaires (highlighted in light gray), with many questions identifying positive differences in all four cohorts (dark gray). Questions in white either did not change or decreased.

TABLE I
Survey Question Response Patterns and Question Categories

Survey Questions
Transferrable Skills
I have strong leadership skills.
I have strong interpersonal (social) skills.
I am able to develop a professional network.
I am able to work effectively with others.
I am able to work effectively on my own.
I am able to manage my time effectively.
I am able to work through obstacles or challenges.
Research Knowledge
I am able to write a research proposal/plan.
I am able to write a research abstract.
I am able to create a research poster.
I am able to give an oral research presentation.
I am able to communicate technical information to people within my discipline.
I am able to communicate technical information to people outside my discipline.
Knowledge of the process of research in this area
Knowledge of the research literature in this area
Knowledge of the research skills and/or lab techniques in this area
Knowledge of the graduate school application process
Knowledge of how to do statistical analysis of research data
Knowledge of how to interpret research data
Knowledge of how to apply research data
Global Competence and Self-identity
When I notice cultural differences, my culture tends to have the better approach.
I have a definite purpose in my life.
I can explain my personal values to people who are different from me.
Most of my friends are from my own ethnic background.
I think of my life in terms of giving back to society.
I am informed of current issues that impact international relations.
I know who I am as a person.
I feel threatened around people from backgrounds very different from my own.
I often get out of my comfort zone to better understand myself.
I am willing to defend my own views when they differ from others.
I am confident that I can take care of myself in a completely new situation.
I see myself as a global citizen.
I understand how various cultures of this world interact socially.
I get offended often by people who do not understand my point-of-view.
I am able to take on various roles as appropriate in different cultural and ethnic settings.
I put my beliefs into action by standing up for my principles.
I consider different cultural perspectives when evaluating global problems.
I know how to analyze the basic characteristics of a culture.
I am sensitive to those who are discriminated against.
I prefer to work with people who have different cultural values from me.
I am accepting of people with different religious and spiritual traditions.
I put the needs of others above my own personal wants.
I can discuss cultural differences from an informed perspective.
I am developing a meaningful philosophy of life.
I intentionally involve people from many cultural backgrounds in my life.
I rarely question what I have been taught about the world around me.
I constantly need affirmative confirmation about myself from others.
I enjoy when my friends from other cultures teach me about our cultural differences.
I consciously behave in terms of making a difference.
I am open to people who strive to live lives very different from my own life style.

A. Transferrable Skills & Global Competence

Results of the survey indicate an increase in self assessed transferrable (i.e., soft, employability) skills. Students who participated in ELCIR reported they have stronger leadership, time management, and interpersonal (social) skills; are more able to work effectively independently and with others; and are better equipped to work through obstacles or challenges following the program. Independ travel and research engagement has shown o increase students confidence, which may have resulted in their higher self-assessment of these transferable skills. These skills are deemed necessary by esteemed engineering organizations, such as the Accreditation Board for Engineering and Technology (ABET) [7]. Apart from technical skills and theoretical content, transferrable skills are vital in engineering work. Because engineering is universal and the term encompasses a myriad of fields/branches, engineers often collaborate across countries and disciplines, which requires communication and interpersonal skills.

B. Research Knowledge & Intent to Pursue Graduate School

Whether an engineer attends graduate school or works in the industry, research knowledge will be utilized (e.g., scientific method, statistical analysis) when reading and writing publications; and during technical problem solving, engineering problem identification, and product development, etc.

Following the program, students were expected to be better informed about the research process (e.g., creating and presenting a research poster) and the scientific method. Students expressed confidence in their ability to partake in the research poster process and present the selected problem statement; however, many students did not report an increase in statistical analysis skills, or knowledge of research literature in their selected area. As the course was an introduction to research focusing on how to define a problem and develop a proposal, rather than executing research and analyzing data, knowledge gain in this area needs to be collected/asked in a different way. Students also reported that they were not familiar with graduate school application process, indicating a possible weakness in the program.

Students in cohorts 2016, 2017, and 2019 were asked about their future plans in their post survey (fig. 8). Over 50% of students indicated they were planning on attending graduate school, with the 2016 cohort witnessing the highest number of students inspired to attend graduate school: 86%. Fifty-three percent of students in 2017 and 69% in 2019 indicated their interest in advanced academic degrees. The numbers are high considering many students do not begin to consider graduate school until further along in their college career. The goal of the course is to familiarize young students with the essentials of research methods/process; although students did not report an increase in statistical knowledge, they expressed an interest in graduate school.

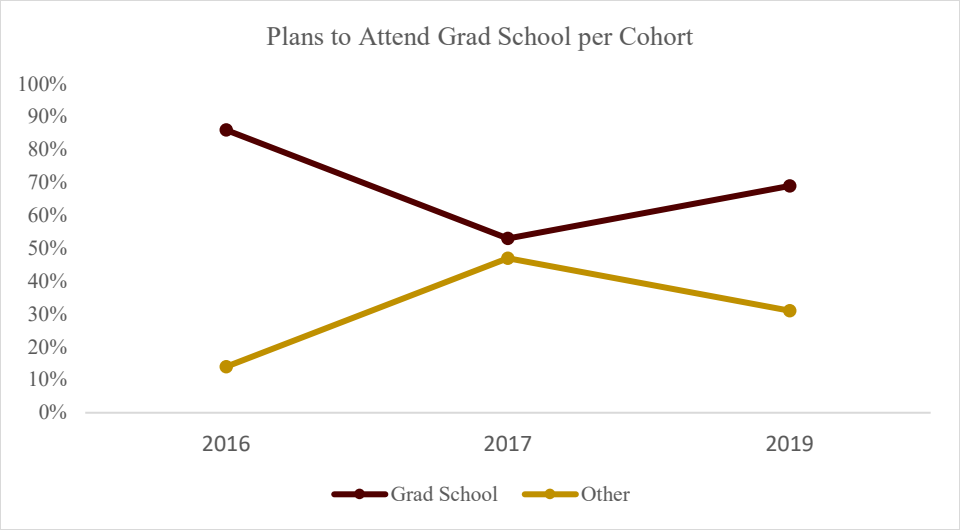

Fig. 8. Plans to attend grad school: 2016-2019 cohorts. The 2018 cohort was not asked about their future plans.

C. Self-efficacy and Self-identity

Eleven survey questions focused on the students' self-identity and self-efficacy, and all eleven questions increased or decreased appropriately, indicating a possible boost of confidence and deeper understanding of oneself after the ELCIR program. Self-efficacy is the belief that one can achieve what one sets out to do [8] and is a strong predictor of student success. Students often report an increase in self-efficacy and/or self-confidence after participating in a global program [9]-[11]. The questions in this survey provided an indirect glimpse into ELCIR students' self-efficacy before and after the program. An increase in both self-confidence and self-efficacy was observed by increases in students' willingness to defend their views when they differed from others', and in their assurance that they could confidently maneuver independently in a novel situation. Following the program, students more confidently defended their principles and felt they were developing a meaningful philosophy of life. Additionally, they required less affirmative confirmation from others and did not feel antagonized by someone with differing perspectives.

D. Global Competence

Following the ELCIR program, students overwhelmingly identified as global citizens. Students better understood how cultural interactions, felt more informed about cultural differences and current issues that impact international relations, were more accepting of others whose religious/spiritual traditions differed from their own, and will consider different cultural perspectives when evaluating global programs. Engineers are universally essential and can potentially find employment in one of the many global engineering firms, where they will have to collaborate with people who differ from them in thinking, language, or culture; thus, engineers must be prepared to work in any country and with any number of diverse populations.

Conclusion

The quantitative and qualitative data analyzed showed that the program is positively impacting participating students. Student participants demonstrated higher confidence levels, cultural competence, and an understanding of research. Following the program, students were more accepting of perspectives that differed from theirs and were confident in defending their principles in the face of dissent. All students identified as a "global citizen", felt informed about cultural differences, and valued differences in others. Retention and graduation rates were higher for the ELCIR participants when compared to their peers within the college. The program incited an interest in graduate school and/or research in the students, with 53%-86% of students indicating they would like to pursue a graduate degree. The ELCIR program set out to positively impact URM students in an effort to increase retention and peak student interest in research and/or graduate school, and it accomplished that and more.

Seventy-two percent of students who participated in the ELCIR program identified as "Hispanic or Latino of any Race". Participating in the experience helped those students, especially those with Mexican heritage, explore their culture and apply it to their identity; survey commentary offered by the students indicated a deeper understanding of the similarities and differences between Mexican and American culture, and both an appreciation and increase in pride in their own culture. Responses indicated students came into the experience with a perspective of Mexican people and research in Mexico that was challenged by their participation in ELCIR and their experiences in Yucatan, culminating in a positive cultural experience and mutual cultural respect. Students who identified as Hispanic, Latino, or Mexican-American gained an admiration of the culture, as well as respect for themselves and their heritage. Some responses provided by the students were:

- "Coming from a Mexican heritage, traveling and embracing the Yucatan lifestyle was eye opening. I used to think that all Mexicans were similar in beliefs and way of living, but traveling to Yucatan has made me realize that not all of Mexico is the same. The uniqueness of every part of Mexico is what makes me proud of saying that I am Mexican."
- "I am Pacific Islander, Asian and white. I am more excited to work with other students and professors from other countries because when it comes to the pursuit of a higher education, we all have similar goals."
- "It makes me proud being a person of a minority doing research."
- "It has helped me see the diversity that is within my own ethnic country and it makes me even prouder of my ethnic country and what I am achieving here."
- "I became so much more proud of my culture after visiting Mexico. Here in the US, you always hear people denounce Mexico and its citizens for the violence and corruption that is occurring in only some parts of the nation. Visiting Yucatan, and its peaceful environment, made me incredibly proud to be a part of this heritage. We were also able to visit several Mayan ruins, which were spectacular. Once I came back to the US, all I heard for a month was Spanish music! I absolutely love and miss Mexico!"

Recent research shows that cultural immersion provides authentic cross-cultural experiences that ultimately increases self-awareness, cultural knowledge, and skills [12]-[13].

Cultural and self-awareness not only defines who we are, but it also influences the various ways we interact with the world. By becoming more aware by virtue of our daily lives and/or experience such as programs like the ELCIR, students can enjoy more meaningful interactions with others, while at the same time, strengthening their sense of self. A powerful finding in our study was the increase levels of self-awareness and cultural identity that students experienced. And thus, we strongly presume and correlate that one of reasons for the high retention and graduation we experienced in the ELCIR program had a direct link to the increase of self-awareness and cultural identity that students experienced.

Acknowledgment

As this program would not had been possible without the support of many collaborators, friends and institutions, we would like to take this opportunity to thank them for supporting the program and allocating resources to make this program a reality all these years: The College of Engineering at Texas A&M University (TAMU), The Yucatan Initiative, Universidad Marista, Universidad Politécnica de Yucatan, SIIDETEY, Mr. Ricardo Bello Bolio as Co-PI of the Yucatan Initiative, Dr. John Walewski as the co-faculty leader, Mr. Chris Cantrell of TAMU's Office of the Vice Chancellor and Dean, and Dr. Carlos Wabi as the inaugural host in Yucatan of the ELCIR program.

References

[1] "Student Demographics." Texas A&M University Accountability. https://accountability.tamu.edu/All-Metrics/Mixed-Metrics/Student-Demographics (Accessed February 11, 2022).

[2] Veenstra, C., & Herrin, G. D., "An Analysis of Graduation Rates At Research Universities," in *American Society for Engineering Education's 2006 Annual Conference & Exposition, June, 2006, Chicago, IL.* Available: https://peer.asee.org/collections/11

[3] "College of Engineering: ENGR[X]." Texas A&M University Catalogs. https://catalog.tamu.edu/undergraduate/engineering/ (Accessed February 10, 2022).

[4] "Undergraduate Student Retention & Graduation." Texas A&M University Accountability. https://accountability.tamu.edu/All-Metrics/Mixed-Metrics/Undergraduate-Student-Retention-Graduation (Accessed November 11, 2021).

[5] "Aerospace Engineering Bachelor of Science Program Requirements." Texas A&M University Catalogs. https://catalog.tamu.edu/undergraduate/engineering/aerospace/bs/#programrequirementstet (Accessed November 11, 2021).

[6] Brazos County. (2020, Mar.23) *2nd Amended Brazos County Shelter in Place Order Under County Judge Declaration Of Local State Disaster Due to Public Health Emergency.* [Online]. Available: https://www.brazoscountytx.gov/DocumentCenter/View/3096/2nd-Amended-Shelter-In-Place-Order?bidId

[7] ABET, Baltimore, Maryland USA. *Criteria for Accrediting Engineering Programs,* (2020-2021). Accessed: November 11, 2021. [Online]. Available: EAC Criteria (abet.org)

[8] Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman.

[9] de Diego-Lázaro, B., Winn, K., & Adelaida Restrepo, M. (2020). "Cultural Competence and Self-Efficacy After Study Abroad Experiences." *American Journal of Speech-Language Pathology*, 29(4), 1896–1909. https://doi.org/10.1044/2020_AJSLP-19-00101

[10] Jochum, C., Rawlings, J. R., & Tejada, A. M. (2017). "The Effects of Study Abroad on Spanish Teachers' Self-Efficacy: A Multiple Case Study." *Frontiers: The Interdisciplinary Journal of Study Abroad*, 29(1), 28–45. https://eric.ed.gov/?id=EJ1141589

[11] Arghode, V., Heminger, S., and McLean, G. (2021). "Career Self-efficacy and Education Abroad: Implications for Future Global Workforce." *European Journal of Training and Development,* 45.1, 1-13. https://www.emerald.com/insight/content/doi/10.1108/EJTD-02-2020-0034/full/html

[12] Bender, K., Negi, N., & Fowler, D. (2010). "Exploring the Relationship Between Self-awareness and Student Commitment and Understanding of Culturally Responsive Social

Work Practice." *Journal of Ethnic and Cultural Diversity in Social Work,* 19(1), 34-53. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3523726/

[13] Smith-Augustine, S., Dowden, A., Wiggins, A., & Hall, L. (2014). "International Immersion in Belize: Fostering Counseling Students' Cultural Self-awareness." *International Journal for the Advancement of Counselling*, 36, 468-484. https://doi.org/10.1007/s10447-014-9219-y

Appendix

Survey Questions	1	2	3	4	5
I have strong leadership skills.	1	2	3	4	5
I have strong interpersonal (social) skills.	1	2	3	4	5
I am able to develop a professional network.	1	2	3	4	5
I am able to work effectively with others.	1	2	3	4	5
I am able to work effectively on my own.	1	2	3	4	5
I am able to manage my time effectively.	1	2	3	4	5
I am able to work through obstacles or challenges.	1	2	3	4	5
I am able to write a research proposal/plan.	1	2	3	4	5
I am able to write a research abstract.	1	2	3	4	5
I am able to create a research poster.	1	2	3	4	5
I am able to give an oral research presentation.	1	2	3	4	5
I am able to communicate technical information to people within my discipline.	1	2	3	4	5
I am able to communicate technical information to people outside my discipline.	1	2	3	4	5
Knowledge of the process of research in this area	1	2	3	4	5
Knowledge of the research literature in this area	1	2	3	4	5
Knowledge of the research skills and/or lab techniques in this area	1	2	3	4	5
Knowledge of the graduate school application process	1	2	3	4	5
Knowledge of how to do statistical analysis of research data	1	2	3	4	5
Knowledge of how to interpret research data	1	2	3	4	5
Knowledge of how to apply research data	1	2	3	4	5
When I notice cultural differences, my culture tends to have the better approach.	1	2	3	4	5
I have a definite purpose in my life.	1	2	3	4	5
I can explain my personal values to people who are different from me.	1	2	3	4	5
Most of my friends are from my own ethnic background.	1	2	3	4	5
I think of my life in terms of giving back to society.	1	2	3	4	5
I am informed of current issues that impact international relations.	1	2	3	4	5
I know who I am as a person.	1	2	3	4	5
I feel threatened around people from backgrounds very different from my own.	1	2	3	4	5
I often get out of my comfort zone to better understand myself.	1	2	3	4	5
I am willing to defend my own views when they differ from others.	1	2	3	4	5
I am confident that I can take care of myself in a completely new situation.	1	2	3	4	5
I see myself as a global citizen.	1	2	3	4	5
I understand how various cultures of this world interact socially.	1	2	3	4	5
I get offended often by people who do not understand my point-of-view.	1	2	3	4	5
I am able to take on various roles as appropriate in different cultural and ethnic settings.	1	2	3	4	5
I put my beliefs into action by standing up for my principles.	1	2	3	4	5
I consider different cultural perspectives when evaluating global problems.	1	2	3	4	5
I know how to analyze the basic characteristics of a culture.	1	2	3	4	5
I am sensitive to those who are discriminated against.	1	2	3	4	5
I prefer to work with people who have different cultural values from me.	1	2	3	4	5
I am accepting of people with different religious and spiritual traditions.	1	2	3	4	5
I put the needs of others above my own personal wants.	1	2	3	4	5
I can discuss cultural differences from an informed perspective.	1	2	3	4	5
I am developing a meaningful philosophy of life.	1	2	3	4	5
I intentionally involve people from many cultural backgrounds in my life.	1	2	3	4	5
I rarely question what I have been taught about the world around me.	1	2	3	4	5
I constantly need affirmative confirmation about myself from others.	1	2	3	4	5
I enjoy when my friends from other cultures teach me about our cultural differences.	1	2	3	4	5
I consciously behave in terms of making a difference.	1	2	3	4	5
I am open to people who strive to live lives very different from my own life style.	1	2	3	4	5

Abbreviated ELCIR Syllabus

(Sample Only)

COURSE DESCRIPTION

This course is comprised of three parts: lectures, visits to research labs, and deliverables via Canvas during Spring 20XX and includes the development and presentation of a research proposal and poster during summer and fall 20XX. The lectures start during the Spring semester and continue during the time in Mexico. The visits to research labs are scheduled as part of a TAMU Study Abroad Program in Merida during a two-week experience in the Yucatan of Mexico. The online deliverables are scheduled after the study abroad experience. The course is sponsored by the Introduction to Research Abroad Program (ELCIR) and by the Yucatan Initiative Project (YI).

The lecture segment of the course is designed to provide a theoretical introduction to research and to the scientific method through workshops in College Station and ten two-hour sessions in Mexico. The objective is to introduce students to basic steps required to develop a research proposal. This includes administrative and ethical aspects required for a standard submission to a sponsor. The format of the lecture sections includes lectures, presentations of ongoing research projects, and in-class exercises. The lectures segment are co-taught by instructors from universities in Merida and Texas A&M University, and students from our host universities attend this course.

Visits to research laboratories consists of approximately six 4-hour lab visits, designed for the students to be exposed to hands-on research. Students will view and practice the use of the scientific method, and interact with researchers to better understand the formulation of research ideas, to the implementation of their research projects. This segment of the course is managed by the YI project, and consists in visits to lab members of the Yucatan Research Consortium (SIIDETEY).

The online-group discussions and deliverables portion of the course is designed to support students on the submission of their research proposals. Instructors will provide online support to students during the summer to facilitate the submission of the deliverables that are scheduled every two weeks during the summer (after the completion of the study abroad experience). By the end of the summer students will complete a written research proposal, prepare and make a 10 minute PowerPoint presentation, and prepare and present a poster during the ELCIR-YI closing summit early in the Fall 20XX.

COURSE-LEVEL OUTCOMES

1. Define and understand the scientific method
2. Distinguish the difference between scientific and non-scientific information.
3. Develop basic skills to apply the scientific method
4. Participate in laboratory research that applies the scientific method
5. Write a research proposal that follows the scientific method
6. Construct a research poster that follows academic standards
7. Present a research poster in an academic setting
8. Develop global competency: global fluency, adaptability, interpersonal skills, and problem-solving abilities. These professional and transferable skills are crucial skills for our graduates today.
    a. Global Fluency
        i. Self-awareness: Know yourself. Understand how one's culture and life experience has shaped their values and ways of feeling, perceiving, interpreting, thinking, and behaving. LO: Identify one's own cultural/personal rules, biases, and values or Explain how one's culture and life experience has shaped their values and ways of feeling, perceiving, interpreting, thinking, and behaving.
        ii. Knowledge of Cultural Worldview Frameworks: Awareness, knowledge, and understanding of cultural groups other than one's own. Knowledge of cultural similarities and differences between countries and the ability to analyze how people's lives and experiences in other countries may shape or affect what they consider to be at stake in the workplace. LO: Explain how cultural similarities and

differences can impact your work

iii. Cultural Respect: Suspend judgment, respect different points of view, and recognize the other can add value to the solution of a certain situation. LO: Describe a global experience situation where you had to suspend judgment, recognize you needed assistance, and seek support, including an explanation of the resources you used for guidance within your novel/unfamiliar situation (e.g., ask the locals for places that is safe to go).

b. Adaptability: Begin to feel comfortable bridging cultural differences while staying true to one's values. Effectively adapt to diverse and/or ambiguous situations, and having the flexibility of mind and command of technical knowledge to be able to adjust and adapt to multiple ways of defining as well as resolving problems (Groll, 2013). LO: Explain how to adjust yourself or a problem approach to new environment or a new context.

c. Interpersonal Skills: Interact effectively and appropriately with diverse others. Engage in relationships with others in ways that show respect for and understanding of the other's perspectives and experiences, but that are also true to one's own beliefs and values (King & Baxter-Magolda, 2005). Interact (work and communicate) effectively in a global environment by being able to convey one's ideas in a way to develop a shared understanding. Work effectively with others by considering different points of view to support a shared purpose or goal. This skill supports teamwork and communication as byproducts of the experience. LO: Describe a global experience situation where you interacted effectively and appropriately with a diverse group to support a shared purpose or goal and describe how that knowledge can be transferred into the workplace.

d. Problem Solving: Use knowledge, facts, perspectives, and data from different cultures when considering different solutions to problems. Having a broader view of problem solving by recognizing and considering cultural differences and global factors that may impact situations in professional environments. Not only respecting different ideas, but also incorporating the different ideas into the solution when appropriate. LO: Explain global and cultural factors to consider in problem solving.

VENUES

Lectures: Texas A&M University campus, Universidad Marista de Merida and Universidad Politécnica Yucatan (UPY) – exact location for each student to be determined

Laboratory Visits: At laboratories/members of the Research Consortium of Yucatan (SIIDETEY) participating in the Yucatan Initiative

Canvas: Submission of individual deliverables as outlines below

COURSE REQUIREMENTS

Students are expected to actively participate in pre-departure meetings, class discussions, labs, visits to cultural sites, and prepare and present a final poster. All students will undertake written, reading, and presentation assignments. Completing pre- and post-departure surveys part of the course expectation.

Spring mandatory workshops:

- Class introduction and expectations, Yucatan Initiative, research expectation, research areas
- Logistics overview, programs orientation and cultural IQ workshop

COURSE SCHEDULE

The course schedule is preliminary and consists of three parts: lectures, lab visits, and course deliverables. A comprehensive schedule is attached. The schedules for lectures and lab visits are outlined below. Details on the technical (lab) visits are also attached.

OUTLINE OF LECTURES

- **Day 1 Monday:** Integration (ice breaker), Into to research course
- **Day 2 Tuesday:** The nature of scientific research
- **Day 3 Wednesday:** The process of scientific research

- **Day 4 Thursday:** Ethics in research
- **Day 5 Friday:** Scientific information
- **Day 6 Monday:** The research protocol
- **Day 7 Tuesday:** Research protocol workshop. Part 1.
- **Day 8 Wednesday:** Research protocol workshop. Part 2.
- **Day 9 Thursday:** Student presentations

OUTLINE OF TECHNICAL (LAB) VISITS

- **Day 1 Monday:** Yucatan Science and Technology Park (PCTY)
- **Day 2 Tuesday:** Yucatan Center for Scientific Research (CICY)
- **Day 3 Wednesday:** Yucatan Center for Scientific Research (CICY)
- **Day 4 Thursday:** Unidad Sureste del Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco A.C. (CIATEJ)
- **Day 5 Friday:** Unidad Sureste del Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco A.C. (CIATEJ)
- **Day 6 Monday:** Autonomous University of Yucatan— Exact Science and Engineering Campus (UADY-CCEI)
- **Day 7 Tuesday:** Autonomous University of Yucatan— Exact Science and Engineering Campus (UADY-CCEI)
- **Day 8 Wednesday:** Hacienda Sotuta de Peón
- **Day 9 Thursday:** Explore Merida
- **Day 10 Friday:** TBD

OUTLINE OF COURSE DELIVERABLES

Due Date	Assignment
	Research Proposal Deliverable ONE: ▪ Project Title ▪ Research Question ▪ Introduction (1/2 page) ▪ Literature Review (1 page)
	Research Proposal Deliverable TWO: ▪ Hypotheses ▪ Objectives
	Research Proposal Deliverable THREE: ▪ Experimental Design (1 page)
	Research Proposal Deliverable FOUR: ▪ Research Program: Description of Activities and Schedule (1 page) ▪ Research Scientific and Social Impacts (1/4 page)
	Research Proposal Deliverable FIVE: ▪ Research Resources ▪ Research Team: PIs Qualifications (1/4 page) ▪ Research Infrastructure (1/4 page) ▪ Budget (1/4 page) ▪ References
	Poster Competition Research Proposal Deliverable SIX: ▪ Integration of Proposal: Final Version ▪ **Poster**
	FINAL POSTER SUBMITTED VIA Canvas
	Poster Presentation

COURSE GRADING

Complete pre-and post-departure surveys	10%
Participate in all required activities	10%
Cultural Reflection	10%
Complete Proposal - (6 Written deliverables)	50%
Final research poster and presentation	20%
Total	100%

The criteria for grading is defined as follows:

A = Outstanding ability for problem solving, logic and cleanliness in the presentation of results. Greater than or equal to 90 % credit.

B = Acceptable ability for problem solving, logic and cleanliness in the presentation of results. Greater than or equal to 80 % credit and less than 90 % credit.

C = Limited ability for problem solving, logic and cleanliness in the presentation of results. Greater than or equal to 70 % credit and less than 80 % credit.

D = Poor ability for problem solving, logic and cleanliness in the presentation of results. Greater than or equal to 60 % credit and less than 70 % credit.

F = Unacceptable ability for problem solving, logic and cleanliness in the presentation of results. Less than 60 % credit.