ASEE 2022 ANNUAL CONFERENCE
Excellence Through Diversity
MINNEAPOLIS, MINNESOTA, JUNE 26TH-29TH, 2022 ASEE
Paper ID #38317

Increasing Global Competencies through International Interdisciplinary Undergraduate Research on Big Data in Energy and Related Infrastructure

Bimal P. Nepal (Professor)

Dr Bimal Nepal is Professor in the Department of Engineering Technology and Industrial Distribution at Texas A&M University. His research interests are in manufacturing, distribution, supply chain management, and engineering education.

Eakalak Khan

Increasing Global Competencies through International Interdisciplinary Undergraduate Research on Big Data in Energy and Related Infrastructure

Abstract

This paper describes the first year of the implementation of a three-year long NSF-funded International Experience for Students (IRES) Site Track-1 project. As a part of the IRES Site Track-1 project, three engineering programs at three U.S. universities have collaborated on a project to increase the global competencies of undergraduate engineering/computer science students through a summer international research training program in big data in energy and related infrastructure in partnership with the Universiti Teknologi Petronas in Perak, Malaysia. The U.S. Universities included Texas A&M University, North Dakota State University, and University of Nevada at Las Vegas. The IRES program includes two-week pre-visit trainings on cultural and global aspects and six-week team-based research experience at the partner Malaysian university. However, due to COVID-19 restriction, all activities in the first year was conducted virtually in Summer 2021. A total of 9 participants were selected, three each from the three US Universities. The IRES participants were divided into three teams. Each project team consisted of one member from four participating institutions (3 U.S. and one Malaysian) thus providing students with a global team environment. Furthermore, of those 4 student members in a team, they represented multiple engineering disciplines. A survey conducted before and after the program showed net overall improvement in the research aptitude of the participants and their understanding on research methods, professional presentation skills, and global teamwork. Furthermore, the IRES students also attended a month-long training on global culture and received a certificate on global competency issues by the Halliburton Global Engineering Program at Texas A&M University.

Introduction

The rise of a globalized economy and advancements in information technologies have led to the engineering workplaces becoming more global [1]. Engineers having some kind of global exposure through study abroad programs, international research, or volunteer experiences are increasingly in greater demand [2]. Such global exposures also provide networking and skill development opportunities that would not be accessible to students in their home country [3]. Students in science, technology, engineering, and mathematics (STEM) fields can also leverage global experience to solve global issues more efficiently because of their better understanding of international problems and cultural awareness. Daniel et al. [2] found in their study that over eighty percent of the 850 companies they interviewed, believe that their business would grow if their employees received international exposure and know-how. The same study concludes that employers will be putting more and more emphasis on global competence in their new hires. Similarly, on a strategic level the National Science Foundation [4], American Society for Engineering Education [5], and National Research Council [1] have identified the need for engineering global preparedness among the STEM students in the United States.

There are multiple ways students can gain international experience including study abroad, international internships, multinational projects, and class activities in a course [6][7][4][5]. Prior studies have shown that international experience improves student graduation and retention rates in engineering programs [8][6]. For example, O-Connell and Ayllon [9][7] reported that they had almost 100% graduation rate for all of their study abroad students at the University of Missouri. However, research also shows that only 7.5% engineering students in U.S. universities participate in the study abroad program [10][8]. While many universities and engineering colleges are working diligently to increase the number of students along with their diversity in study abroad programs [11] [9], minority and first-generation student participation is still very low relative to overall percentage. One of the reasons being that these programs are expensive and not all students can afford to fund these experiences themselves. To that end, the multiple student-centered global research programs offered by the Office of International Science and Engineering (OISE) at the National Science Foundation (NSF) has certainly helped many students from all walks of life [12].

The International Research Experiences for Students (IRES) is an NSF funded program which supports graduate and undergraduate students who are permanent residents/citizens of the United States to participate international research and related activities. As mentioned on their website, "The overarching, long-term goal of the IRES program is to enhance U.S. leadership in science and engineering research and education and to strengthen economic competitiveness through training the next generation of research leaders" [13]. There are two tracks to the IRES program. The IRES Track I program (IRES Sites) is a program which engages STEM students (both graduates and undergraduates) in a collaborative research environment at an international location. The international host location is generally another research university or lab which provides highly skilled mentorship in the chosen IRES disciplines. The IRES Track II program (Advanced Studies Institute) is fifteen to twenty-one days short but intense program geared towards graduate students only. This is more focused towards advanced research and the selection of international location must be justified by involvement of distinguished researchers in the target field.

This paper describes implementation and student outcomes of the first cohort of IRES Site Track I program on big data in energy and related infrastructure. The remainder of the paper is organized as follows. Section 2 provides the detailed information about the IRES site. Section 3 discusses the evaluation of the program and its results. Section 4, touches on the challenges and the lessons learned during the implementation of the IRES program during an ongoing COVID-19 pandemic situation. Lastly, section 5 concludes the paper by summarizing the key findings.

IRES Site in Big Data in Energy and Related Infrastructure

Project background

The IRES project is a collaboration among three land grant universities from the states of Texas, Nevada and North Dakota. The three participating universities are Texas A&M University (TAMU), University of Nevada Las Vegas (UNLV) and North Dakota State University (NDSU). All three universities represent states that are leaders in energy production/harvesting, and each focus on a different type of energy from fossil to renewable energy. The year of 2021 was the first of the implementation of the program which took place during the summer.

The host country for the IRES program was Malaysia, which is the third largest economy among the Association of Southeast Asian Nations with a gross domestic product of over US$350 billion [14] In addition, Malaysia also attracted about US$13 billion in annual foreign direct investment between 2008 and 2019 [14]. It hosts a large number of global companies and expatriates from other countries making it ideal for a more diverse global exposure for US undergraduate students. As for the host university, the Universiti Teknologi Petronas (UTP) is one of the highly ranked technical universities in Asia (# 99 in Asia in overall; and #151-200 worldwide, in Engineering, QS Stars University Ratings [15]). The university also has large top-notch facilities dedicated to energy and environmental related research as it is a solely owned subsidiary of Petronas, a national oil and gas company of the Malaysian government. In addition, it has six research institutes focusing on oil and gas industry including enhanced oil recovery and transport infrastructure for smart mobility [16]. Depending upon the nature of a project, the IRES participants can have access to all these facilities. The participants will also work with faculty mentors at UTP who are highly qualified scholars in applications of big data and analytics tools in the energy industry.

This collaborative IRES project had three distinct goals:

- Increase enthusiasm and research skills of undergraduate students from underrepresented population groups who otherwise might not have an international opportunity for professional development;
- Prepare students with professional skills to enter in a diverse and global workforce in energy and related infrastructure industry; and
- Foster collaboration between the faculty and students from Asian (one of the fastest growing regions in the world) and American Universities.

Table 1 illustrates the relationship between project goals and objectives, and the proposed strategies to accomplish those objectives.

Table 1: Project goals, objectives, and strategies

Goals and Objectives:	Strategies
Goal 1: Increase enthusiasm and research skills in undergraduate students from underrepresented population groups who otherwise might not have an international professional development opportunity.	
Objective 1: Recruit *9 undergraduate* students from various engineering majors each year for three years, 3/year each from TAMU, NDSU, and UNLV with about two-third from women and underrepresented population groups.	**Strategy 1:** Recruit about two-thirds of participating students *from women and underrepresented minority* group*s from* engineering or related disciplines. Of those two-thirds, recruit about one-third from first generation students. **Strategy 2:** To create multidisciplinary and diverse teams, priority is given to recruit students from multiple engineering majors from three collaborating institutions.
Goal 2: Prepare students with professional skills to enter in a diverse and global STEM/data-savvy workforce in energy and related infrastructure industry	

Objective 2: Provide participants with a 6-week long *high quality multi-disciplinary international research experience* in real world projects using big data and machine learning projects that are energy related at a reputed international institution in Asia.	**Strategy 3:** Collaborate with faculty from Universiti Teknologi Petronas (*UTP) in* Malaysia (*The IRES Site)*, to provide international research and cultural experience to TAMU/NDSU/UNLV students. **Strategy 4:** Collaborate with the host institution team (UTP mentors) to identify real world multi-disciplinary projects for students on application of data science in energy and infrastructure from local companies.
Objective 3: Provide training and exposure to these students on global cultures, and international workplaces.	**Strategy 5**: Deliver a seminar on Asian culture and social practices (prior to the IRES site visit in Malaysia), and discuss influence of the social values on the workplace culture. **Strategy 6:** Form a joint project team by including students from the Malaysian University (the host) and the US Universities to provide students with a multi-cultural and international team experience.
Objective 4: Use a *rigorous assessment and tracking process*, and *evaluate the impact* of proposed activities on student outcomes.	**Strategy 7:** Through an external and independent evaluator, evaluate the impact of the project by employing a mixed methods research approach consisting of both validated instruments for quantitative study, and open-ended structured interviews for the students' experiences.
Goal 3: Foster collaboration between the faculty and students from Asian (one of the fastest growing regions in the world) and American Universities.	**Strategy 8:** Jointly advise the student teams and work on a journal manuscript based on the industrial research project with the objective to develop future collaborative research proposals.

Application and selection process

Students were recruited from the three participating US universities (TAMU, NDSU, and UNLV). While preference was given to engineering majors, applications were also considered from other STEM majors that were closely related to big data such as statistics and computer science. A separate website (https://www.nsfetap.org/award/103/opportunity/105) set up by the NSF was used for application submission and management for the program. The eligibility criteria included: (a) desire to participate in applied research; (b) major in an engineering, engineering technology, statistics, or closely related field; (c) junior or senior standing in the following Fall semester/quarter (d) cumulative GPA of 3.0 or better (out of 4.0 maximum scale); and (f) U.S. citizen or permanent resident. The selection team consisted of principal investigators from TAMU, NDSU, and UNLV. The metrics used for selection were prior research experience, academic performance, knowledge in statistics and data analytics, recommendation letters, and personal statement.

Figure 1 shows the distributions of the participants based on gender, ethnicity and engineering majors. It shows that the project was able to meet all of its diversity goals. Among the 9 participants selected for 2021 cohort, 56% of them were female and 44% male. Likewise, 33% identified as White, 11% African American, 22% Hispanic, and 34% of them were Asian American. Please note that the program was also successful in ensuring the interdisciplinary nature of projects as participating students came from different STEM majors (see Figure 1).

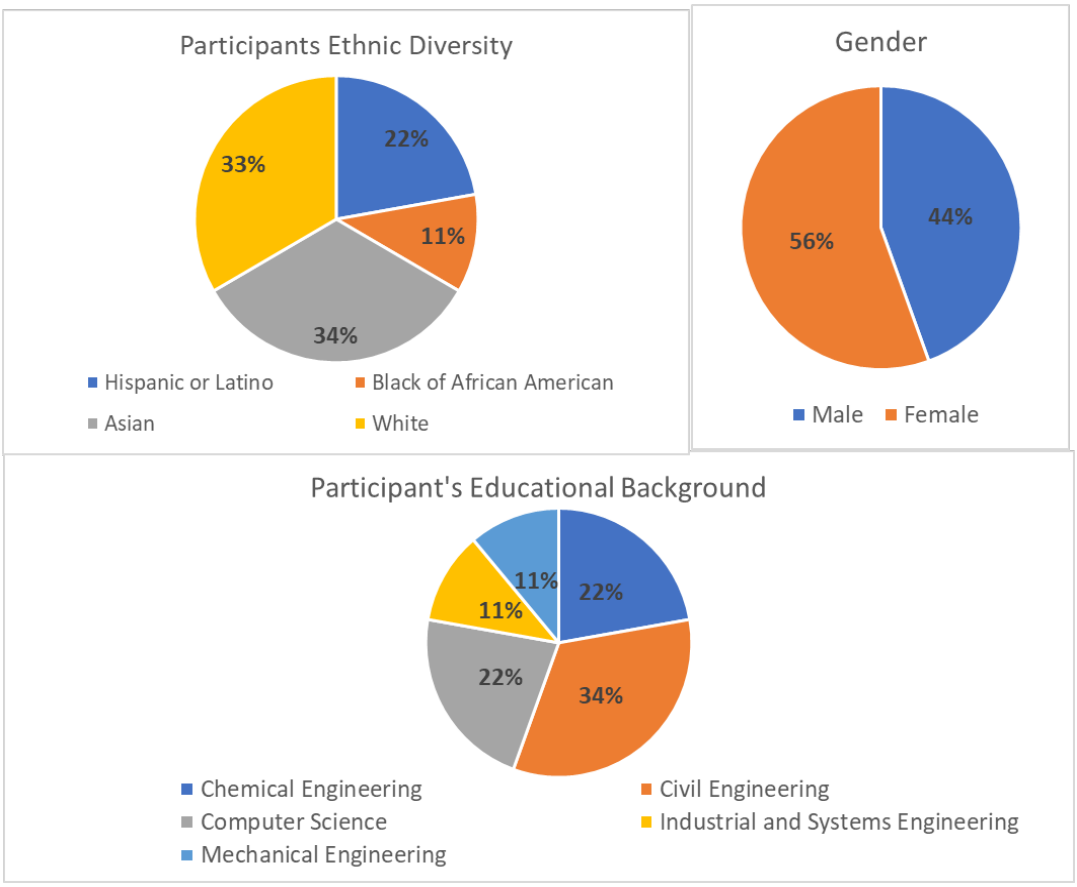

Figure 1: 2021 IRES participants background/demographic information

Research and training activities

According to the original program design, this 6-week long summer research internship should have been held in Malaysia, where students would be exposed to different work culture and environment. However, due to the travel restrictions associated with the ongoing pandemic, the entire program was conducted virtually. Even with the virtual program, various activities and online training programs were designed to maintain the essence of cross-cultural interaction and learning. For example, there was a virtual global competency training which started prior to the 6-week research training period and lasted throughout the summer.

The global training program was organized by the Halliburton Global Engineering Program at Texas A&M University [17]. The curriculum of the training program was developed based on the Global Competence Certificate by the AFS Intercultural Program [18]. It included online video modules on topics related to diverse work cultures, social justice, and working in a global team. Students would review the video modules and participate in online discussion forums. There were 4 meetings scheduled with the TAMU instructor throughout the summer and in fall (May, June, July, and October). These meetings were held on Fridays from 9:30-11:00 AM via Zoom. In addition to these four meetings, there was no other meeting commitments for the participants. Students would review video modules and use the meeting times to discuss the materials with the instructor or facilitator. At the conclusion of this program, each student was awarded a certificate, also known as Global Competence Certificate.

In addition to the global competence certificate program, the participants also attended multiple research seminars during the 6-week research period.

Research projects and teams

The students were divided into three different groups, with each group having a primary faculty mentor from UTP, a faculty co-mentor from one of the participating U.S. universities, and a graduate student mentor. In order to maintain the diversity, no two students in the group were from the same university. The deliverables and the scope of the three projects (one for each group) were decided mutually among the student group and their mentors. The three projects selected in 2021 were [19]:

1. *Life Cycle Assessment for Drinking Water Treatment Plant*
   The project evaluated various water treatment processes in Malaysia and assessed the environmental impacts. Life cycle assessment (LCA) was used to identify the environmental impacts like global warming potential, eutrophication, ozone depletion and human health (particulate air and cancer toxicity). The outcomes of the LCA study exposed a flaw in the energy generation nexus which relies on fossil fuels as primary energy resources thus, posing significant effects to the environment.

2. *Real Time Predictive Maintenance on Plant Equipment*
   The goal of this project was to analyze data from sensors in pipelines and create a predictive model to accurately predict plant equipment failure. Autoregressive integrated moving average was better at predicting the corrosion rates as compared to Random Forests and Support Vector Machines. The machine learning algorithm was applied to time-series based corrosion data and the Integrity Operating Window (IOW) tags. Analyzing the corrosion rates yielded more accurate results than analyzing the IOW tags.

3. *Predictive Assessment on Fluid-Hammer Effect in Piping networks of LNG Regasification System*
   The goal of this research was to conduct predictive assessment of the water hammering effect in pipe networks of LNG regasification systems through analysis of modelling simulations and visualization software. Aspen HYSYS was utilized to run simulations with varying flow rates and schedule 40 pipe dimensions. The data was collected and visualized using Tableau. The graphs revealed that larger diameter pipes had better capacity to withstand the pressure surges of higher flow rates than smaller diameter pipes.

Program Evaluation and Survey

The program used an independent project evaluator for the external evaluation of the IRES program for all three participating universities. The evaluation was both formative and summative, and used a mixture of quantitative and qualitative approaches. As a part of the formative process, at the end of this 6-week program, students were asked to fill out a survey indicating their perceived usefulness and satisfaction with the program. The formative aspect of the evaluation helped understand the extent to which project goals were achieved and if not, what the obstacles limiting its successful implementation were. Similarly, to assess the impact of this program on student's

professional skills to enter the global workforce, a summative evaluation was conducted. It used a survey based on Global Perspective Inventory [20] (e.g., importance of cultural context in judging what to know and value) and the Engineering Global Preparedness Index (e.g., belief that one can make a difference through engineering problem solving). The evaluator conducted pre- and post-student surveys at the beginning and end of the IRES experience using a Likert scale. The survey instrument included two set of questions: i) first set of questions measured research skills (that is, to what extent the participant were able to gain these skills as a result of this program); and ii) the second set of questions measured the gain in professional skills related to global perspective inventory.

Figure 2 shows results of pre- and post-IRES survey with respect to research skills. As depicted in the bar chart (Figure 2), there was an increase in research skills in post-survey with respect to all 9 metrics ranging from "theory guided research" to "literature review". Some of the highest gains in research skills set were observed in "theory guided research", "collecting and analyzing data", "literature review" and "report writing and poster presentation".

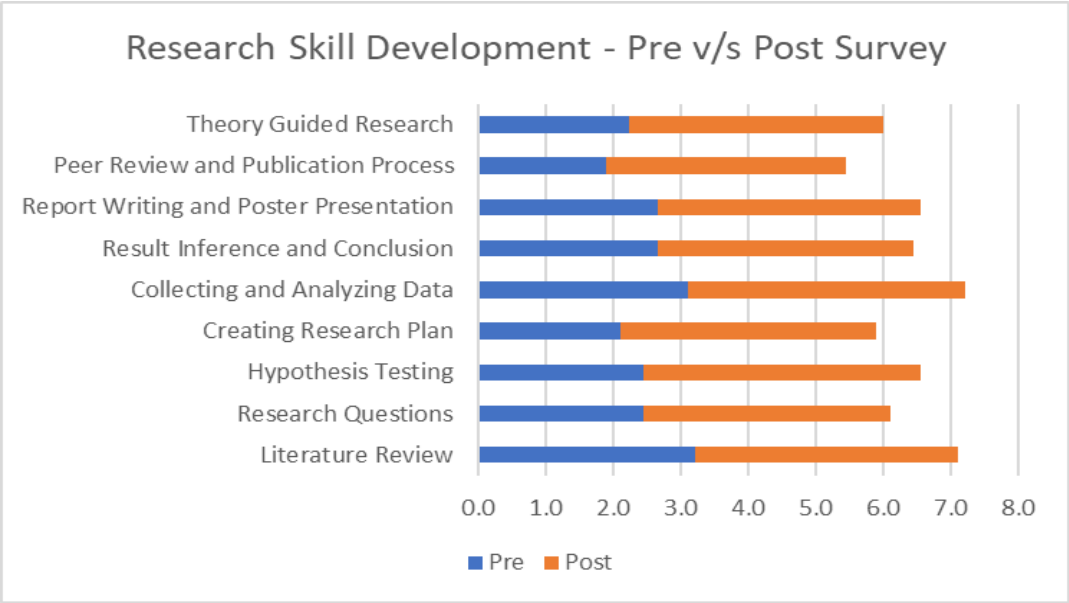

Figure 2: Average research skills score before and after the IRES program

Similarly. Table 2 shows the description of the survey questionnaire used during pre and post evaluation of professional skill development, especially with respect to global perspective inventory. Figure 3 presents a comparison of Pre-Vs. Post-IRES scores with respect to global perspective questions. The survey data showed a gain in student scores (or agreement with the statement provided in the question) in the post-IRES survey than those in the pre- survey for all 12 questions albeit at varying degrees.

In Figure 3, few observations could be found interesting. First, there was a very little change in student score when it comes to defending their views (Question F in Table 2). This could also be interpreted as their ability to put their views across respectfully did not change as a result of this project, which could be considered as normal. Likewise, as expected, their scores did not change

for Question B (considering different cultural perspective when evaluating global problems), Question G (accepting of people with different religious and spiritual traditions), and Question I (giving back to society). In other words, the participants were already exposed to the multi-cultural environment at their universities. More specifically, American students are taught to be respectful to all people regardless of their cultural and religious background. It is also deeply rooted in American culture and values to appreciate and be respectful to everyone.

Table 2: Description of questions related to global perspective inventory

Question	Description
A	I take into account different perspectives before drawing conclusions about the world around me.
B	I consider different cultural perspectives when evaluating global problems.
C	I understand how various cultures of this world interact socially.
D	I can discuss cultural differences from an informed perspective.
E	I can explain my own personal values to people who are different from me.
F	I am willing to defend my views when they differ from others.
G	I am accepting of people with different religious and spiritual traditions.
H	I am open to people who strive to live lives very different from my own style.
I	I think of my life in terms of giving back to society.
J	I consciously behave in terms of making a difference.
K	I frequently interact with people from a race/ethnic group different from my own.
L	I frequently interact with people from a country different from my own.

Lastly, their level of agreement with the following global learning skills increased after the program: considering different perspectives before drawing conclusions (Q.A), understanding how various cultures interact socially (Q.C), ability to discuss cultural differences (Q.D), explaining personal values (Q.E), consciously behaving to making a difference (Q.J), and interacting with people from countries different than their own (Q.L).

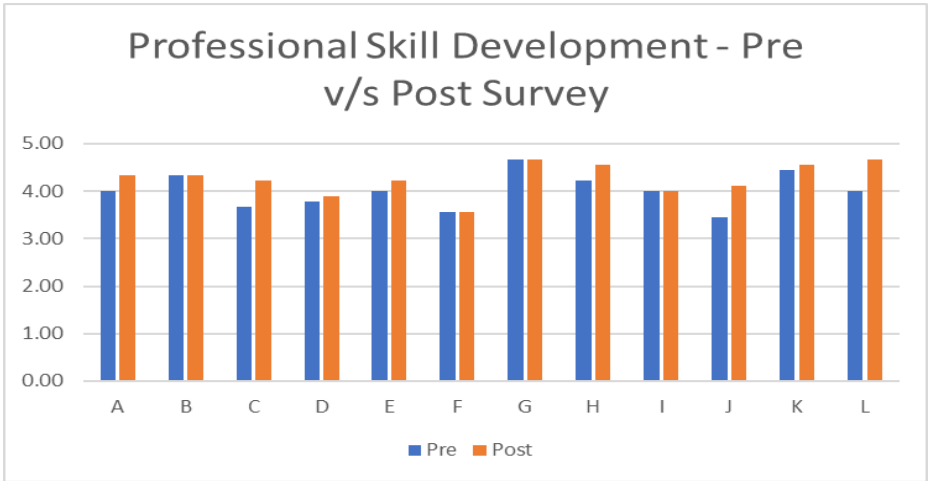

Figure 3: Average professional development score before and after the IRES program.

Challenges and Lessons Learned

As mentioned earlier, this program was delayed by one year, with the first cohort being cancelled in 2020 due to the pandemic. Even in 2021, due to ongoing COVID-19 pandemic and various travel restrictions imposed by the government of Malaysia as well as the U.S., it was not possible to run the program in-person at the site. In order to avoid continued cancellation, the PI team had decided to run it virtually with a prior approval from the NSF. With that, the program faced few challenges. In that regard, a key challenge was finding a way for effective collaboration among research groups and keeping the students engaged. Also, TAMU and NDSU are in Central Time Zone (UTC -6:00), whereas UNLV is Pacific Standard Time (UTC -8:00) and UTP is Malaysian Time (UTC +8:00). These time differences made it difficult to have a fixed schedule common to all the participants. The other challenge was repeated cancellation of Malaysia trip due to ongoing public health concerns and restrictions, which created confusion among the students.

The lessons learned during this project can be summarized as follows. Virtual communication medium and cloud platforms were extensively used by the groups and mentors to collaborate on the projects. Virtual seminars and team building exercises were initiated so as to keep the students encouraged and involved during the program. Apart from regular conversations with graduate mentors, weekly meetings were scheduled with faculty advisors to provide progress on the projects. The deliverables and objectives of the projects had to be adjusted by making them simulation/software based (as opposed to laboratory/field experimental based) and could be worked on remotely. In order to substitute the global experience which students would have gotten with an in-person program, they were enrolled in a Global Competency Program and received a certificate upon completion. All these steps ensured that although the program was virtual, it did not compromise on the quality of research and global experiences for participating students. One of the key lessons learned based on the feedback received from participating students, was the role of graduate mentors on their experience. The participants thought that the graduate students were more approachable and able to provide guidance from a personal experience on a career in research and graduate school.

Conclusions

This paper presented program activities of the first cohort of an NSF-funded IRES program on student's research and professional skills as they participated in a global immersive learning experience. The theme of the IRES site was big data in energy and related infrastructure. A total of 9 students were recruited from each of the three participating U.S. universities (that included TAMU, UNLV, and NDSU). Students were divided into three multi-disciplinary groups, with each group having a faculty mentor and a graduate mentor from the host university and a faculty co-mentor and a graduate mentor from one of the three participating universities. All three groups worked on research projects under the guidance of these mentors that involved an application of data science tools and techniques in energy industry or related sectors. A structured survey instrument was employed to assess the impact of IRES program on research competency of students as well as their global cultural understanding and preparedness. The survey results showed that there were net positive gains in average research competency scores as reported by the participants after the program. Those gains were seen across the student populations groups regardless of gender, diversity, student academic standing, and the type of their home institutions.

Further, the survey results have revealed that even with the challenges of COVID-19 pandemic and the entire program being virtual, all of the initial goals were successfully accomplished.

On the other hand, the ongoing pandemic situation did affect the project in multiple ways. Most importantly, the global trip had to be cancelled because of travel restriction by the host country and continuing surge of multiple variants of the COVID-19 throughout the year 2021. Lastly, despite multiple efforts from both PIs and IRES site hosts, because of pandemic situation industry connection could not be made in the first year. Going forward, the PI team is working with their Malaysian counterpart to begin that process in the Spring semester so that industry connections can be ensured when the next cohort starts in July 2022.

Acknowledgements: *This work was supported by the National Science Foundation's International Experience for Students (IRES) Site grant. (**Grant Numbers:** OISE# 1952490-TAMU, 1952493-NDSU, and 195249-UNLV7**)**. Any opinions, findings, conclusions, or recommendations presented are those of the authors and do not necessarily reflect the views of the National Science Foundation. Lastly, the PI appreciates the work of The Mark USA in providing the evaluation data for this project.*

References

1. Streiner, S., Cunningham, S.C., Huang, S., Levonisova, S., Matherly, C., Besterfield-Sacre, M.E., Shuman, L., Ragusa, G., and Kotys-Schwartz, D. (2014). Exploring engineering education in broader context: A framework of engineering global preparedness, *ASEE Annual Conference and Exposition, Conference Proceedings*, Indianapolis, IN, June 15-18.
2. Daniel, S., Xie, F., and Kedia, B. (2014). Internationalization of U.S. education in the 21st century- the future of international and foreign language studies, *A Research Conference on National Needs and Policy Implications*. Williamsburg, VA, April 11-13. Retrieved from https://www.wm.edu/offices/revescenter/globalengagement/internationalization/index.php (on Aug 19, 2019)
3. Wilkins, K. W., Rosa-Marín, A., Weisend, R. E., & Kurosawa, E. (2020). Benefits, Challenges, and Opportunities for International Research Collaborations: Perspectives from the Limnology and Oceanography Research Exchange. *Limnology and Oceanography Bulletin*, 29(4), 125-130.
4. NSF 06-08 (2006). Investing in America's Future, *National Science Foundation' Strategic Plan*. Retrieved from https://www.nsf.gov/pubs/2006/nsf0648/NSF-06-48.pdf (on September, 4, 2019).
5. American Society for Engineering Education (2010). *The Green Report – Engineering Education for a Changing World*. Accessed from https://www.asee.org/papers-and-publications/publications/The-Green-Report.pdf (on Aug 20, 2019).
6. Berque, D., Chiba, H., Ohkura, M., Sripian, P., & Sugaya, M. (2020, July). Fostering Cross-Cultural Research by Cross-Cultural Student Teams: A Case Study Related to Kawaii (Cute) Robot Design. *International Conference on Human-Computer Interaction* (pp. 553-563). Springer, Cham.

7. Kulturel-Konak, S., A. Konak, A., I. E. Esparragoza, I.E., and Kremer, G. E.O. (2016). Measuring global awareness interest development of engineering and information technology students, *IEEE Frontiers in Education Conference*, Erie, PA, USA, 2016, pp. 1-5.
8. Engel, L. (2017). Underrepresented Students in US Study Abroad: Investigating Impacts. *IIE Center for Academic Mobility Research and Impact*, Retrieved from https://www.iie.org/Research-and-Insights/Publications/Underrepresented-Students-and-Study-Abroad (on August 19, 2019).
9. O'Connell, R. and Ayllon, M. (2016). Student perceptions of global knowledge and skills acquired during a five-week study abroad program, *IEEE Frontiers in Education Conference*, Erie, PA, pp. 1-4.
10. Zappe, S.E. and Folmer, J. (2015). A Cross-Sectional Study of Engineering Student Perceptions and Experiences Related to Global Readiness, *Proceedings of the ASEE Annual Conference & Exposition*, Seattle, WA, June 14-17.
11. IIE (2014). Meeting America's global education challenge, why generation study abroad, *IIE Generation Study Abroad*, Retrieved from https://www.iie.org/programs/generation-study-abroad(on September 4, 2019).
12. Mitchell, B. S. and Hoare, J. (2021). Principal Investigator Perspectives on the Effects of COVID-19 on their NSF-Funded International Research Projects with Students in 2020, *Journal of International Engineering Education*: Vol. 3: Iss. 1, Article 2.
13. International Research Experience for Students (2021). National Science Foundation, https://beta.nsf.gov/funding/opportunities/international-research retrieved on December 26, 2021.
14. Trading Economics (2019). *Malaysia Foreign Direct Investment*, Retrieved from https://tradingeconomics.com/malaysia/foreign-direct-investment (on Aug 22, 2019).
15. QS Top Universities (2019). *QS STARS University Ratings*, Universiti Teknologi Petronas, Retrieved from https://www.topuniversities.com/universities/universiti-teknologi-petronas-petronas#888193 (on Sept 6, 2019).
16. University Home Page (2019). *Universiti Teknologi Petronas*, https://www.utp.edu.my/Pages/Home.aspx
17. Halliburton Engineering Global Programs. *Texas A&M University Engineering*. (n.d.). Retrieved February 6, 2022, from https://engineering.tamu.edu/academics/global/index.html
18. AFS Intercultural Programs. (n.d.). Retrieved February 6, 2022, from https://afs.org/
19. IRES Program in Big Data in Energy & Related Infrastructure (2022). *Texas A&M University College of Engineering*, https://ires.engr.tamu.edu/.
20. Braskamp, L. A., Braskamp, D. C., Merrill, K. C., and Engberg, M. (2014). Global Perspective Inventory (GPI): Its purpose, construction, potential uses, and psychometric characteristics. *Glob. Perspect. Inst*, 1-35.