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Virtual International Innovative Program on Sustainable Engineering: Lessons Learned from a Successful U.S.-Perú Collaborative Effort

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Abstract

Being challenged by the COVID-19 pandemic, innovative educational solutions are needed to provide global educational experiences to undergraduate students. In Summer 2020, a US-Peru collaborative effort was conducted using virtual platforms to deliver a Sustainable Engineering and Leadership Practices (SELP) program. In previous years, the SELP program included face-to-face sessions with interactive technical, cultural, and social activities. The SELP program focuses on engineering and management challenges to address societal needs. The technical sessions cover sustainability principles and engineering practices following a problem-based solution approach. Emphasis is placed on the importance to communicate the short, medium, and long-term consequences of engineering solutions to decision-makers and society. Practical real-world examples are presented to illustrate the concepts learned in the course. The cultural activities include visits to museums and local heritage sites while the social activities involve cuisine, sports, and local attractions. With the participation of thirty students in a virtual environment, binational teams were assembled and developed projects to address sustainability problems affecting their communities. This paper summarizes the lessons learned and what led to a successful well-rounded educational experience with virtual technical, cultural, and social interactive sessions.

Introduction

With the rapid changes in the world's resources, the challenges for future engineers are complex. Therefore, future engineers need to develop a global perspective to understand the impact of their engineering solutions at the micro and macro levels. There is a dearth of engineers with the global skills necessary to work in multidisciplinary teams and multinational projects. Engineering curricula are typically focused on developing traditional engineering skills, and there is a need to complement the student's education and provide a global perspective to address real-world problems. Beginning in 2012, an international Summer program has been delivered by a US-Peru team of faculty and staff with the participation of students from both universities. The program has contributed to learning about a number of technical and non-technical problems associated with the engineering grand challenges identified by the US National Academy of Engineering (NAE). The specific topic of the Summer program has been evolving since 2012.

In March 2020, thirty students were ready to participate in the Sustainable Engineering and Leadership Practices (SELP) program when the pandemic spread worldwide. The program's major focus is infrastructure resiliency and sustainability. The program traditionally included face-to-face technical, social, and cultural interactive activities. Field technical visits to evaluate community problems and propose engineering solutions were part of the program. The social activities aimed to foster personal interaction with breakfast, lunch, dinners, sports activities, games, and talent-shows. The cultural activities involved visits to historical places, museums, and archeological sites. Social distancing and international travel restrictions as protective

measures to mitigate the spread of COVID 19 made the initial program agenda unfeasible. Therefore, a dilemma arose when facing the decision of canceling the program or re-structuring the activities to be offered through virtual platforms relaying mainly in a synchronous learning approach. With the support from both universities at all management levels, the challenge of preparing and delivering an international program with technical, social, and cultural virtual activities was undertaken. This paper describes the program objectives, activities, and results of the SELP program conducted virtually in Summer 2020.

Literature Review

Past studies have validated the high value of study abroad programs to higher education through enabling a multitude of learning outcomes such as intercultural learning, global awareness, personal growth, foreign language acquisition, and disciplinary learning [1,2,3,4,5,6,7]. Students with the essential global competencies and experiences develop essential skills needed to succeed in the ever-increasing global marketplace and are appreciated by prospective employers. Also, students with international educational experiences have increased awareness of career options and a clearer idea of their career goals [8,9]. Braskamp [1] suggested that study abroad experiences enhance global learning and development, which has become the core of holistic student development.

One of the most important goals of any study abroad program is to broaden students' global perspectives and train future leaders to be more effective, respectful of other cultures. Studies have demonstrated that these programs have the potential for nurturing a global citizenry if effective pedagogical techniques are adopted [10,11]. The study abroad literature supports the integration of experiential learning as a key medium for promoting higher-impact learning. Lutterman-Aguilar and Gingerich [10] argued that for an effective study abroad experience students should be prepared as responsible global citizens and in order to do that the programs need to incorporate the principles of experiential education that encourage reflection, critical analysis, and synthesis. A similar model was presented by McLaughlin and Johnson [12] for short-term study abroad programs.

Empirical studies have conducted to measure the personal and professional development of students who participated in study abroad programs and evaluated factors such as civic commitments (locally and internationally), knowledge production, philanthropy, social entrepreneurship, voluntary simplicity, self-efficacy and independence and occupation experiences [13, 14,15,16,17,18, 19]. These studies found that study abroad experiences have a strong influence on multiple markers of personal and professional growth, however, this impact varies based on the amount of time elapsed since the experience [20].

Higher education institutions have been settings elevated goals of facilitating high-impact learning experiences such as study abroad programs. During 2018-19, the number of U.S. students who studied abroad for credit grew by 1.6 percent that represented about 1.8 percent of all U.S. students enrolled at institutions of higher education in the United States [21]. Despite the increase in the overall percentage of study abroad participation in recent years, minority students are still greatly underrepresented in study abroad mostly due to financial pressure. Due to

COVID-19, travel restrictions were imposed early in 2020 that changed the operation of study abroad and student exchange programs in higher education. Most of the universities had to pivot to continue providing these high-impact learning opportunities to their students. To support and continue international experiences during this time, universities considered opportunities beyond in-person mobility and took advantage of virtual instruction approaches. However, studies have shown that most of the institutions are of the view that sharing best practices for virtual internationalization experiences will be critical to fill the knowledge gap [22,23].

In spite of these efforts, there are studies that claim that regardless of the advances in technology, the key component to a student's learning success is the human factor. Effective communication with a teaching style fostering course activities that are synchronized with the students' cognitive maturity level is essential. Face-to-face student-teacher interaction increases the teacher's ability to engage with the student, allows for better gauging of the student's level of understanding, and facilitates the use of active learning. Therefore, the main challenge of virtual courses is how to create a learning environment that promotes student-teacher interaction [24].

SELP Program Description and Objectives

The SELP program covers principles and real-world problems related to infrastructure sustainability following a problem-based approach to address societal needs. The program focuses on technical environmental, social, economic, and management challenges. development of leadership skills. Emphasis is given on the importance to communicate the short, medium, and long-term consequences of engineering solutions to decision-makers and society. Practical examples are presented as case studies during the course to illustrate the concepts. The specific objectives of the program are:

1. To educate students on the sustainability principles to restore and improve infrastructure with an emphasis on Smart Cities.
2. To develop innovative thinking and leadership skills to seek solutions to engineering problems while considering social impacts.
3. To provide students the opportunity to work in bi-national and interdisciplinary teams using virtual platforms to integrate global perspectives address infrastructure challenges.
4. To make students aware of their cultural differences and similarities to build strong relationships while working together to overcome common challenges.
5. To familiarize students with technical engineering lingo in English and Spanish.

SELP Program Activities and Educational Expectations

The SELP program activities were planned to support a holistic student learning approach. It ultimately envisioned engineering students as prospective humanitarian social advocates of innovative solutions to sustain infrastructure, mitigate the impact of extreme events, and improve living standards in a global society. Therefore, the program was conceived to develop the engineering, leadership, and innovative thinking skills required by engineering students to succeed in a local, regional, national, and international economy. The program activities included attending lectures, working in teams, participating in technical tours and cultural and social interactive virtual sessions. Students who completed this course were expected to:

1. Be able to apply sustainability principles to engineering solutions to address societal needs.
2. Be able to use practical tools to demonstrate the consequences of engineering solutions in the short, medium, and long-term and communicate the results through virtual platforms.
3. Be able to identify and communicate the impacts of management, business, and engineering decisions on the quality of life of society and the well-being of the citizens.
4. Be able to function effectively in an international, multi-cultural team using virtual platforms.

SELP Program Assessment Results and Evaluation

A post-program survey was conducted to gauge how the program has affected the students in terms of intercultural personal sensitivity and professional development. Bennette [25] defines intercultural competence as "the ability to communicate effectively in cross-cultural situations and to relate appropriately in a variety of cultural contexts." A total of thirteen students participated in the program and 93% responded to the survey. Personal development is viewed as the process of growth, evolution, expansion, and maturation of the individual self-whereas professional development is referred to as developing skills for the purpose of advancement in the field. The 10-item questionnaire was based on a 5-point Likert scale and the choices were: 5=strongly agree, 4=agree, 3=Neutral, 2=disagree, and 1=strongly disagree.

Intercultural Sensitivity

The SELP program included technical sessions to understand common infrastructure problems, sustainability global challenges, and plans of action for the development of Smart Cities. Virtual lectures include the Sustainability Plans and Smart City Plans in the US and Peru, resiliency, environmental sustainability, and renewable energy for Smart cities. Since both Universities are located in cities with water problems, lectures related to sustainable water and wastewater treatment, and nature-based solutions for managing urban water were included in the program.

Students were asked five questions related to intercultural sensitivity and the mean scores for the responses are shown in Figure 1. The first question was related to the student's understanding of global problems. Most of the students (85%) responded that their perspective has been broadened and the program helped them better understand various engineering problems at a global scale (Mean: 4.25, SD:1.138, SE: 0.329).

The American Institute for Foreign Study (AIFS) [26] and other researchers discussed the importance of exploring the impacts of study abroad programs on the students' abilities to recognize, understand, and respect cultural differences. Students should develop multidimensional competencies as a result of higher education programs. These competencies include the awareness of interdisciplinary and global interactions to develop sustainable solutions to address the needs of society. For this purpose, the implementation of international academic programs to promote global cooperative efforts among faculty across disciplines is critical [27].

Figure 1: Students' responses to intercultural sensitivity survey questions on Likert scale

Various cultural awareness and intercultural sensitivity sessions were planned and conducted synchronously online that were well-received by the students. Cultural activities included presentations and virtual tour visits. On the U.S. side, there were presentations about the history, virtual visits to the city downtown, museum of history, and mountains national park. On the Peru side, presentations focused on the Inka's architecture with Machu Picchu as an engineering example of sustainability in practice, and virtual visits to Peruvian museums. Social activities involved asynchronous learning activities with informative videos about food, lifestyle, and idioms in the U.S. and Peru followed by interactive sessions. Students participated in a Peruvian cuisine workshop which ended with a cooking challenge documented in videos posted on social media. There were also marinera dance synchronous workshops and karaoke singing open nights for social interaction.

Table 1 summarizes the mean scores for each question to assess the impact evaluation of intercultural sensitivity. The responses revealed that the participants reported the development of high intercultural sensitivity as a result of the program activities.

Table 1: Summary Statistics of the Intercultural Sensitivity Impact Evaluation

Questions	Mean (n=12)	Standard Deviation	Standard error
1. My participation in the program helped me understand better world problems	4.25	1.138	0.329
2. My participation in the program increased my interest in visiting other parts of the world	4.25	1.357	0.329
3. My participation in the program helped me be more sensitive to other cultures	4.25	1.138	0.329
4. My participation in the program helped me better understand the importance of understanding social and cultural issues for solving problems	4.08	1.165	0.336
5. My participation in the program has increased my cultural awareness in general	3.75	1.138	0.329

Figure 2 shows the responses to the intercultural sensitivity questions in percentages. Interestingly, 75% of students agreed that the program provided enough opportunity to increase their cultural awareness despite the virtual format.

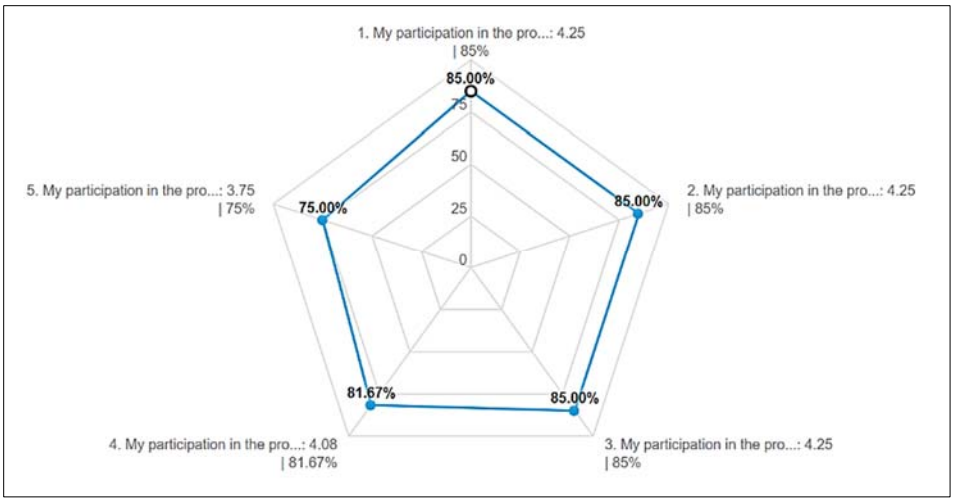

Figure 2: Student responses as percentages, intercultural sensitivity

Personal and Professional Development

Students were asked if their participation in the program has helped them develop at the personal and professional levels. The responses to the questionnaire, as shown in Figure 3, showed a positive impact on the participants (Mean> 4) for all the dimensions of this category.

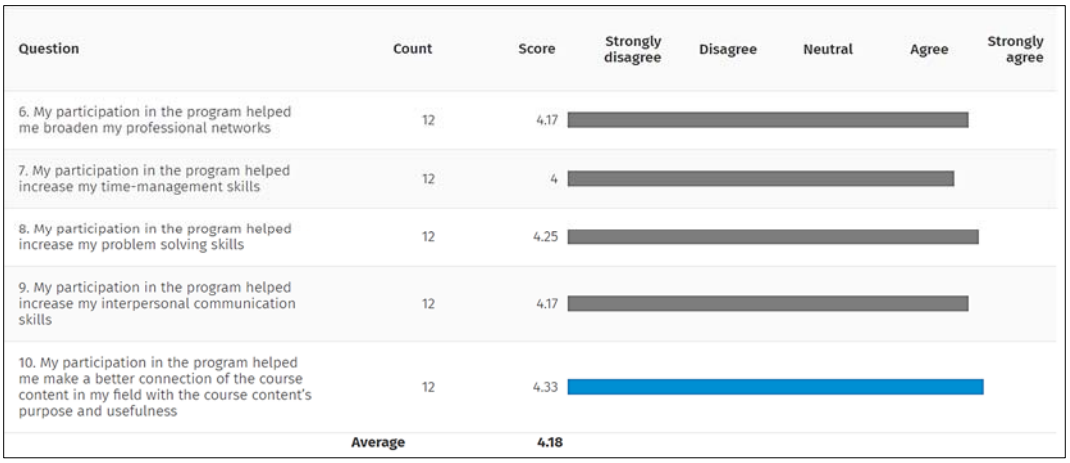

Figure 3: Students' responses to Personal and Professional development survey questions on Likert scale

The personal development questions were focused on time-management and interpersonal communication skills whereas professional development questions were related to networking, problem-solving, and technical skills. Virtual sessions were conducted on Digital Transformation in Construction and Infrastructure, Emerging Mobility Trend and Digitization of Transportation Infrastructure, Microgrids, and Remote Worker Efficiency.

The research topics were community-based problems and students had to design innovative solutions to sustain infrastructure, mitigate the impact of extreme events, and improve society's living standards considering social, economic, and environmental aspects. Binational teams worked in virtual environments to develop sustainable engineering solutions to practical problems. Table 2 shows the project topics with a brief description of the problem addressed and solutions.

Table 2: Research Projects in the SELP Program

Project	Description
SMART + Resilient Infrastructure	This project aimed to create stronger and smarter cities, resilient to climate change, through public participation and interaction in a virtual environment. A survey about climate change effects at a local level was conducted. According to the survey results, the main challenge to implement sustainability policies is to educate the public. Therefore, the project team developed a website application called "InteliGENTE" where citizens can learn more about water, energy, and urban infrastructure and how climate change affects their way of living.
Distributed Generation of a Solar Photovoltaic System	This project explored the usage of renewable energy and its potential in the city. The team proposed a design and sizing of a photovoltaic solar energy system. The energy system was designed for an engineering building and proposes the installation of 88 solar panels to decrease carbon dioxide emissions in the building.
Water Security in Peru	This project focused on addressing water security problems with the implementation of sustainable engineering solutions to foster. health, economic stability, and environmental-friendly practices.
Project Management in the Construction Industry Using Collaborative Platforms	This project seeks to improve productivity in the construction industry. The project team analyzed the impact of collaborative platforms and conducted a comparative study between traditional and modern construction methods.
Shared System of Electric Scooters on the University Campus	The objective of this project is to reduce CO_2 emissions by using alternative transportation methods. The project team proposed the utilization of scooters and developed a plan for implementation in the campus of the University in Peru, as a pilot project to be later extended to the city.
Project Management in Smart Cities	The project team followed the standards of the PMBOK guide and to improve public health by implementing solar energy in hospitals.
Proposed Smart Storm Water System	The project team proposed a sustainable plan to construct a stormwater system in the city.
Proposed Smart Storm Water System	The project team proposed the implementation of sensors to collect data to better manage the sewer system.
Connectivity Infrastructure for Smart Cities	To reduce pollution, the project team proposed smart parking solutions with the implementation of clevercity sensors and the usage of apps and web platforms.

Table 3 summarizes the mean scores for each dimension of the personal and professional development category.

Table 3: Summary Statistics of the Personal and Professional Development Impact Evaluation

Questions	Mean(n=12)	Standard Deviation	Standard error
6 My participation in the program helped me broaden my professional networks	4.17	0.718	0.207
7 My participation in the program helped increase my time-management skills	4.10	0.853	0.246
8 My participation in the program helped increase my problem-solving skills	4.25	0.452	0.131
9. My participation in the program helped increase my interpersonal communication skills	4.17	0.937	0.271
10 My participation in the program helped me make a better connection of the course content in my field with the course content's purpose and usefulness	4.33	0.492	0.142

Figure 4 shows the responses to the personal and professional development questions in percentages. 85% of students responded that the SELP program helps increase their problem-solving skills.

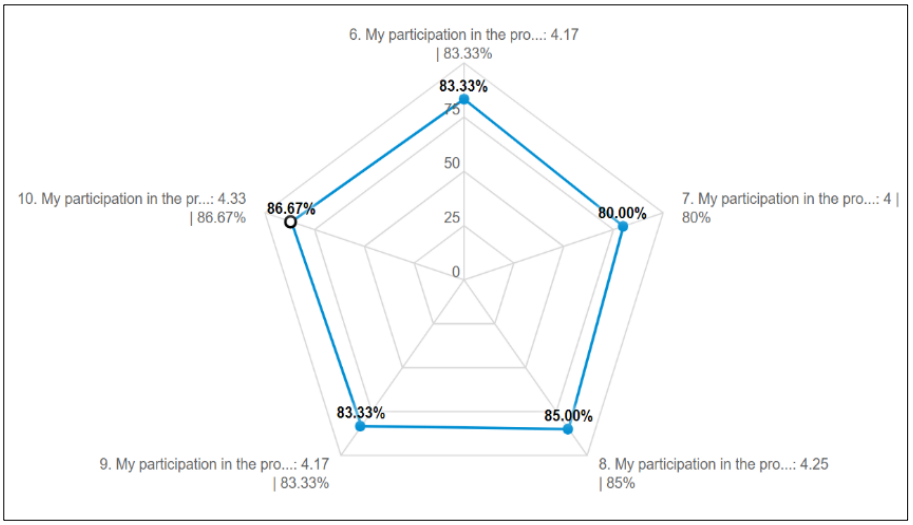

Figure 4: Student responses as percentages, Personal and Professional Development

Conclusions

In the SELP program, students worked in multi-disciplinary teams reporting the high impact of this experience on their time-management and communication skills. Teams were provided multiple opportunities to present their work as a preliminary and final proposal.

The main course structure relied on synchronous learning approach to encourage personal engagement and foster discussion with classmates and instructors. Although, lectures were recorded for future review and students were asked to study some course material at their own pace following an asynchronous learning approach. Therefore, synchronous and asynchronous learning tools were blended in the program with good results.

Based on the survey results, 80% of the students agreed that the program presented an opportunity for enhancing intercultural sensitivity. This covered the two learning objectives (2, 4) of this program and the performance target was set at 70% or greater percentage of respondents who will report a positive impact. In addition, 85% of the students agreed that the program presented an opportunity for enhancing personal and professional development. This covered the three learning objectives (1,3, 5) of this program and the performance target was set at 70% or greater percentage of respondents who will report a positive impact.

The major challenge to overcome in the virtual version of the SELP program was to mimic cultural and social dimensions that required senses that cannot be experienced virtually. A fully educational interactive experience should include activities that involve smell, touch, and taste senses. Cooking and dancing sessions with visuals and audios narrating the “five-sense” experience attempted to overcome virtual limitations, although nothing can really replace direct “in person” interaction.

Overall, the program was able to achieve its goals and provided international learning experiences to a larger number of students than usual. The lesson learned through this experience can lead to a dual offering of such programs (virtual, face-to-face) that will provide further flexibility for financially restrained students to opt for cost-effective virtual programs.

As it is unknown when an in-person SELP program can be offered again due to COVID and its after-effects, there are plans to use immersive technologies such as Virtual Reality (VR) to provide better interactive experiences covering elements such as field visits, virtual competitions, and other social aspects.

References

[1] L. A. Braskamp, D. C. Braskamp, and K. Merrill, “Assessing Progress in Global Learning and Development of Students with Education Abroad Experiences,” Frontiers: The Interdisciplinary Journal of Study Abroad, vol. 18, no. 1, pp. 101–118, 2009.

[2] I. Clarke, T. B. Flaherty, N. D. Wright, and R. M. McMillen, “Student Intercultural Proficiency From Study Abroad Programs.” Journal of Marketing Education, vol. 31, no. 2, pp. 173-181, 2009, doi: 10.1177/0273475309335583.

[3] D. DeGraaf, C. Slagter, K. Larsen, and E. Ditta, “The Long-term Personal and Professional Impacts of Participating in Study Abroad Programs,” Frontiers: The Interdisciplinary Journal of Study Abroad, vol. 23, no. 1, pp. 42–59, 2013.

[4] D. K. Deardorff, “Identification and Assessment of Intercultural Competence as a Student Outcome of Internationalization.” Journal of Studies in International Education, vol. 10, no. 3, pp. 241-266, 2006, doi: 10.1177/1028315306287002.

[5] M. Kurt, N. Olitsky, and P. Geis, “Assessing Global Awareness over Short-Term Study Abroad Sequence: A Factor Analysis,” Frontiers, vol. 23, no. 1, pp. 22-41, Aug. 2013.

[6] R. C. Sutton, A. N. Miller, and D. L. Rubin, “Research design in assessing learning outcomes of education abroad programs,” *In A Guide to Outcomes Assessment in Education Abroad*, Bolen, M. (Ed.), Carlisle, PA: Forum on Education Abroad, 2007, pp. 23-59.

[7] R. C. Sutton and D. L. Rubin, “The GLOSSARI Project: Initial Findings from a System-Wide Research Initiative on Study Abroad Learning Outcomes.” Frontiers: The Interdisciplinary Journal of Study Abroad, vol. 10, no. 1, pp. 65-82, 2004, doi: 10.36366/frontiers.v10i1.133.

[8] T. P. Hannigan, “Vocational Self -Exploratory Behavior and Its Relation to Vocational Self-Concept Crystallization and Work Commitment in U.S. Undergraduates,” PhD. Dissertation, 1998.

[9] T. P. Hannigan, “The Effect of Work Abroad Experiences on Career Development for U.S. Undergraduates.” Frontiers: The Interdisciplinary Journal of Study Abroad, vol. 7, no. 1, pp. 1-23, 2001, doi: 10.36366/frontiers.v7i1.106.

[10] A. Lutterman-Aguilar and O. Gingerich, “Experiential Pedagogy for Study Abroad: Educating for Global Citizenship.” Frontiers: The Interdisciplinary Journal of Study Abroad, vol. 8, no. 1, pp. 41-82, 2002, doi: 10.36366/frontiers.v8i1.94.

[11] M. A. Tarrant, D. L. Rubin, and L. Stoner, “The Added Value of Study Abroad.” Journal of Studies in International Education, vol. 18, no. 2, pp. 141-161, 2013, doi: 10.1177/1028315313497589.

[12] J. S. McLaughlin and D. K. Johnson, “Assessing the Field Course Experiential Learning Model: Transforming Collegiate Short-term Study Abroad Experiences into Rich Learning Environments.” Frontiers: The Interdisciplinary Journal of Study Abroad, vol. 13, no. 1, pp. 65-85, 2006, doi: 10.36366/frontiers.v13i1.174.

[13] H. T. Black and D. L. Duhon, “Assessing the Impact of Business Study Abroad Programs on Cultural Awareness and Personal Development.” Journal of Education for Business, vol. 81, no. 3, pp. 140-144, 2006, doi: 10.3200/joeb.81.3.140-144.

[14] J. S. Carlson and K. F. Widaman, “The effects of study abroad during college on attitudes toward other cultures.” International Journal of Intercultural Relations, vol. 12, no. 1, pp. 1-17, 1988, doi: 10.1016/0147-1767(88)90003-x.

[15] R.M. Gonyea, “The impact of study abroad on senior year engagement,” Association for the Study of Higher Education, Jacksonville, MI, 2008.

[16] B. F. Hadis *, “Gauging the impact of study abroad: how to overcome the limitations of a single-cell design.” Assessment & Evaluation in Higher Education, vol. 30, no. 1, pp. 3-19, 2005, doi: 10.1080/0260293042003243869.

[17] M. J. Stebleton, K. M. Soria, and B. T. Cherney, “The High Impact of Education Abroad: College Students’ Engagement in International Experiences and the Development of Intercultural Competencies.” Frontiers: The Interdisciplinary Journal of Study Abroad, vol. 22, no. 1, pp. 1-24, 2013, doi: 10.36366/frontiers.v22i1.316.

[18] A. Kitsantas, “ Studying abroad: the role of college students’ goals on the development of cross-cultural skills and global understanding,” College Student Journal, vol. 38, no.3, 441+, 2004.

[19] R. M. Paige, G. W. Fry, E. M. Stallman, J. Josić, and J. Jon, “Study abroad for global engagement: the long-term impact of mobility experiences.” Intercultural Education, vol. 20, 2009, doi: 10.1080/14675980903370847.

[20] B. Benson-Schrambach, “Undergraduate study abroad as a tool for vocational discernment,” Journal of Christianity and Foreign Languages, vol. 10, pp. 10-26, 2009

[21] NAFSA, Trends in U.S. Study Abroad, 2019. Available: https://www.nafsa.org/sites/default/files/ektron/files/underscore/study_abroad_by_state.pdf

[22] M. Martel, IIE — COVID-19 Effects on U.S. Higher Education Campuses From Emergency Response to Planning for Future Student Mobility. 2020. [Online]. report.

[23] B. Elisa, “Virtual Internationalization to Increase Access to International Experience,” Conference: Innovative and Inclusive Internationalization: Proceedings of the WES-CIHE Summer Institute June 20–22, 2018 At: Boston, MA, 2019, pp. 31-33.

[24] C. Chang, and A. Chang, “Blended Learning Strategies for Smart Students: Why Do They Fail?” Proceedings of EDULEARN16, Barcelona, Spain, July 2016.

[25] M.J. Bennett, “Defining, Measuring, and Facilitating Intercultural Learning: A Conceptual Introduction to the Intercultural Education Double Supplement”, *Intercultural Education*, vol 20,no.1, S1-S13, 2009.

[26] AIFS Study Abroad Outcomes, 2013. https://www.aifsabroad.com/advisors/pdf/AIFS_Study_Abroad_Outcomes.pdf

[27] C. Chang, L. Calderon-Coello, and A. Chang, “A Knowledge Management Model for the Development of Higher-Level Education Multidimensional Competencies”, Proceeding of the 13th Annual International Technology, Education, and Development Conference INTED, Valencia, Spain, March 2019.