

Exploring the Associations Between Personality Attributes and Transformative Learning of Engineering Study Abroad Program Participants: Year 0

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Abstract

The global nature of the marketplace requires engineering students to be able to work across different cultures as a major differentiator in the competition for engineering jobs. A growing number of US engineering students opt to develop their ability through study abroad experience. However, a given study abroad experience elicits vastly different responses among students: for some students, the experience is life-altering while for others, it is decidedly not. This project stems from these observations and from a desire to ensure that global experiences are highly impactful for all students, and not just a select group. Building on the literature on experiential learning, this research hypothesizes that student impacts could be related to student personality attributes, and aims to explore the associations between personality attributes and transformative learning of engineering study abroad program participants.

Introduction

The global nature of the marketplace requires engineering students to be able to work across different cultures, a major differentiator in the competition for engineering jobs (NASEM, 2017). According to the reports from the National Academies (NAENA, 2020; NASEM, 2017), this ability is crucial for the new generation of global engineers, who will engage in complex global problems. Experiential learning associated with study abroad programs can make a considerable impact on a student's ability to understand complex global problems (Kiely, 2004; Farrugia & Sanger, 2017). This impact is the result of transformative learning, such as "the process of becoming critically aware of how and why our assumptions have come to constrain the way we perceive, understand, and feel about the world" (Mezirow 1991, p. 167). Experiential learning through study abroad programs has been gaining prominence in US colleges of engineering as a means to ignite students' transformative learning.

During the 2015-2016 school year, short-term study abroad programs (STSAPs), with a duration shorter than 8 weeks, represented 63% of the US undergraduate study abroad participants (Strange & Gibson, 2017). The popularity of the STSAPs is driven by the intensive demands of engineering curricula, which make STSAPs a viable option for many students to engage in international experiences (Chang, 2012; Mapp, 2012; Sakurai, 2019). Unfortunately, STSAP participants do not always experience transformative learning due to shortcomings, such as the structure of the programs, inadequate preparation, and facilitation (Green, 2020).

The overarching goal of this research is twofold: (a) to advance our understanding of the formation of engineering students by examining individualized mechanisms that prepare and support them for rich study abroad experiences; and (b) to advance knowledge about the essential components of effective study abroad programs for practitioners and researchers.

Unfortunately, due to the covid-19 pandemic-related international travel restrictions, there has been a considerable delay in the data collection. However, the intended plan of action is given below. We requested and received a year extension from the NSF Program manager.

Theoretical Framework

As the theoretical framework for this project, we hypothesize that there is an association between engineering students' personality attributes with experiential learning theory and transformative learning theory as shown in Figure 1.

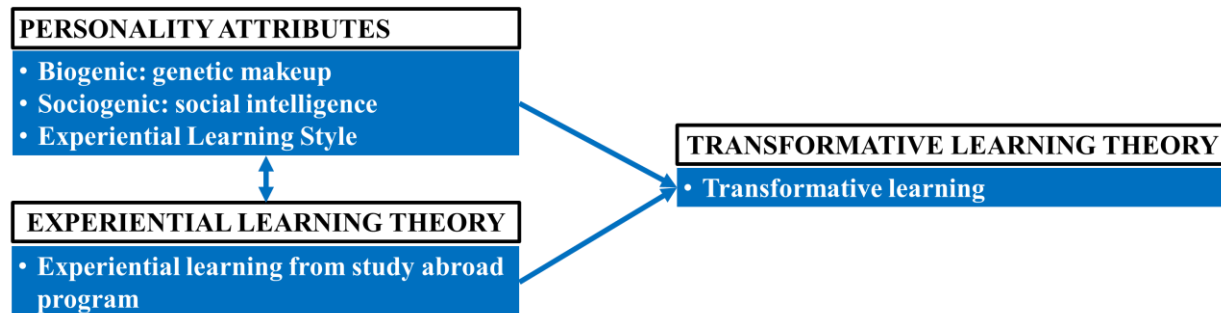


Figure 1. Hypothesized Associations Between Personality Attributes and Experiential and Transformative Learning from STSAP

Research Objective for Year 1

The objective for the first year is to explore any differences by demographic group in personality attributes (biogenic, sociogenic, experiential learning style) and transformative learning, using an online survey. This objective will be used to test the following two null hypotheses against alternative hypotheses.

H01: Personality attributes (biogenic, sociogenic, and experiential learning style) of female/URM students are NOT significantly different from their male/majority counterparts.

H02: Transformative learning experiences of female/URM students are NOT significantly different from their male/majority counterparts.

We will conduct an online survey and recruit interview participants from students who enrolled in STSAP courses, required before going on study abroad. Based on students' preferences and the university logistics, the destinations are determined from Ghana and Ethiopia, France, Germany, Guatemala, and Ireland. The sample estimated for this first objective is given in Table 1 below.

The survey for this Year 1 will consist of four sections: (a) STSAP program characteristics, such as destination and duration, to capture the most effective activities associated with students' transformative learning; (b) scale items to assess three types of personality attributes and transformative learning, namely the Big Five Inventory Short Form (Komarraju et al., 2011), the Kolb Learning Style Inventory (Kolb, 1999), and the Tromsø Social Intelligence Scale (Silvera et al., 2001); (c) open-ended questions to complement scale items; (d) the Transformative Learning Scale (Chieffo & Griffiths, 2004; Strange & Gibson, 2017), and (e) background

questions about participants' demographics (e.g., gender, race/ethnicity, age, major, and student level), and prior exposure to international experiences.

Table 1. Estimation of the Sample Sizes for the Online Survey Participation in Spring 2023

Category	Subgroup	Participants
Gender	Female	20
	Male	30
Ethnicity/Race	Hispanic	6
	Asian	5
	Black	7
	Multiracial	6
	White	26
Total		50

Results

There are no results yet to be reported.

Current Action and Projection

This research is grounded in Kolb's experiential learning theory (a) to explore the structures of the study abroad programs that ensure transformative learning of engineering students and (b) to explore the roles of personality attributes in students' transformative learning. Therefore, this research is expected to reveal effective study abroad program characteristics that promote all study abroad program participants' transformative learning. The findings of this research are expected to aid study abroad practitioners (a) to design successful programs with experiences that are relevant and germane to participants' personality attributes and (b) to accordingly prepare and support engineering student participants' achievement of transformative learning.

This NSF-RIEF Award also aims to develop the PI's ability to conduct engineering education research. The PI has been developing the necessary skillsets for the proposed research activities. The PI is taking courses to build his foundation in engineering education research methods and quantitative and qualitative data analyses. Other activities include network building through participation in conferences and workshops and the development of grant management skills.

Conclusion

The research has barely started due to uncontrollable reasons under the COVID-19 pandemic situation. However, other aspects of this NSF grant have well started. The PIs hope to recruit STSAP participants for data collection during Spring 2023, present the results, and receive peer feedback next year.

Acknowledgments

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