The Future of
Engineering Education
2024 Annual Conference & Exposition

Oregon Convention Center
Portland, OR . June 23 - 26, 2024

ASEE

Paper ID #44083

Exploring and Expanding Support for International Students in Engineering: Faculty Reflections Beyond Academic Boundaries

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WIP -Exploring and Expanding Support for International Students in Engineering: Faculty Reflections Beyond Academic Boundaries

Abstract

Expanding on our previous work [1], this research delves into self-reflection among engineering faculty members who were international students. Our primary objective is to extend learning from using an autoethnographic lens to understand the experiences of faculty members who were once international students themselves, towards the development of a research study to understand how (if at all) faculty members in the United States address the unique needs of the international student community.

The Challenge and Support model by Nevitt Sanford serves as our guiding framework for this research. Nevitt Sanford, a pioneering psychologist in the field of student development, introduced two foundational concepts: the cycles of differentiation and integration and the balance between support and challenge [2]. He emphasized that students undergo processes of self-discovery as unique individuals and members of groups, with challenges arising when they encounter unprepared situations. The available support influences the ability to face these challenges. Sanford highlighted the importance of readiness, challenge, and support as crucial developmental conditions, with the interaction between challenge and support significantly impacting students' growth. A misalignment between these factors can lead to negative outcomes, underscoring the necessity for higher education institutions to provide suitable support for addressing the diverse challenges faced by students.

This paper presents the pilot study results as the authors' reflection that prompted the redesign of our data collection protocol. The authors reflect on the following question: How did their experiences as current or former international students shape their teaching philosophies as engineering educators? These reflections lay the groundwork for developing a research design for a larger study of engineering faculty sentiment and motivation toward addressing international students' needs. Ultimately, a larger research study will help incorporate diverse faculty perspectives when considering how to support international engineering students, recognizing that each student has unique and intricate experiences in both academic and non-academic aspects.

Introduction

The F-1 Visa, designated for academic students, grants a foreign national permission to enter the United States as a full-time student enrolled in an accredited college, university, seminary, conservatory, academic high school, elementary school, or any other recognized academic institution, including language training programs according to the University of Washington. This status signifies that an individual is lawfully present in the United States and is subject to

the privileges and limitations outlined in the immigration regulations [3] pertinent to the F-1 visa category USCIS (2023). The F1 Student population, encompassing both academic and language training programs, as reported by the Department of State (2022) — Bureau of Consular Affairs, [4] demonstrated varying figures over five years: 362,929 in 2018, 364,204 in 2019, 111,387 in 2020, 357,839 in 2021, and 411,131 in 2022. This data reveals that F1 Students experienced an average annual percentage increase of approximately 3.3% during this period. According to the Student and Exchange Visitor Program (SEVP) [5], there were nearly 1.4 million active records for F-1 and M-1 students in 2022 — a 10% increase from 2021 and the largest number of records since 2019. Jaiyeola [6] delves into the intricate connection between culture and society. Their work explores the profound transformations individuals undergo when they embark on a journey to a new environment, embracing the challenge of adapting to unfamiliar cultures and societies. In their pursuit of happiness, international students make the brave decision to leave behind their own culture, society, and home to pursue higher education in foreign institutions. While certain students navigate the transition smoothly with school support, others cultivate resilience and adaptability in response to challenges Jaiyeola [6]. Existing literature sheds light on the hurdles encountered by international students, as well as the ongoing discussions regarding their struggle to find a sense of belonging and pursue the American dream, particularly from a womanist perspective [1]. As highlighted by Perry [7], the literature provides numerous valuable insights into the international student experience. However, the available evidence suggests that there is room for improvement in how universities, faculty members, and various groups can enhance the educational journey for individuals from different nations.

Our specific research focuses on understanding the perspectives of faculty members because they serve as the primary point of contact for international students and spend a significant portion of their day with these students. Consequently, our research is dedicated to exploring faculty perceptions regarding the needs of the international student community in engineering, with the aim of further refining existing processes and making recommendations as deemed necessary Perry [7].

The contribution of international students to U.S. colleges and universities encompasses valuable intellectual, cultural, and economic dimensions [8]. Many institutions boasting significant international student enrollments offer specialized support services aimed at facilitating social integration, academic progress, and linguistic proficiency, thereby enhancing retention rates and fostering student engagement [7][8]. Commonly provided support services include academic advising, language instruction, career guidance, and mental health assistance. Research indicates that international students frequently encounter difficulties related to cultural adaptation, language impediments, and navigating the intricacies of the U.S. educational system [7][9]. Accordingly, the provision of comprehensive support services tailored to the unique needs of international students is crucial for mitigating these challenges and enhancing their overall university experience [7] [8].

Investigating the perceptions that faculty have about the requirements of international students offers a layered understanding of the educational environment. As the main point of interaction for students, faculty members bring valuable insight into the array of challenges these students encounter, often drawing from their own experiences as former international students. By adopting an autoethnographic method and considering the principles of the Challenge and Support model, this study strives to harness the lived experiences of faculty to create robust support mechanisms. These endeavors aim to guide wider institutional strategies to cultivate an environment that is both supportive and welcoming for international students. Embracing the intricate nature of student needs and the crucial role that faculty have in meeting them, our goal is to elevate the educational journey for international students. In shaping our research design, we are inspired by the approach taken by Paul et al. in their examination of faculty viewpoints [10], using it as a benchmark for our inquiry into the sophisticated dynamics of faculty involvement and the requisite support systems for the international student population in the field of engineering.

Purpose

Our research paper explores the experiences of international students through faculty reflection in this pilot study. Rather than conducting an in-depth analysis of the autoethnography results, this paper reports on the research design for the broader study utilizing the data gathered during the exploratory phase. We focus on understanding how faculty members navigate the complex landscape of meeting the diverse needs of international students in the United States. Employing an autoethnographic approach, we reflect introspectively on the journeys of faculty members and their adaptation in addressing student needs. Drawing insights from the Challenge and Support model by Nevitt Sanford, we use this framework to analyze how faculty provide support amidst the challenges faced by international students in their roles as educators. Our main objective is to comprehensively understand faculty perceptions and practices regarding the support of international students in engineering programs. By delving into their experiences, we aim to uncover valuable insights that can inform and enhance institutional efforts aimed at fostering a supportive environment for international students in the United States. Through our research, we seek to contribute to the ongoing discourse concerning the needs of international students and offer practical recommendations for enhancing their academic and extracurricular experiences, as well as outcomes, within engineering programs.

Methods

Creswell and Creswell [11] describe auto-ethnography as a research methodology that analyzes a phenomenon using self-narratives, which would otherwise remain private or buried. Auto-ethnographic reflections have been used in engineering education to provide authors an opportunity to shift from being an "outsider" to an "insider" in the research, which further

enables their voices to be better heard within the community, thus promoting convergence and inclusion [1], [12], [13]. Like [14] we undertook an analytical autoethnography approach, borrowing from [15], and focused on pragmatic reflections and takeaways rather than emphasizing emotions related to our phenomenon of interest.

Nevitt Sanford introduced two fundamental concepts: the cycles of differentiation and integration, and the equilibrium between providing support and presenting challenges. Sanford's work emphasized the journey of students as they navigate their individuality and group affiliations, recognizing the daunting nature of unforeseen situations. The effectiveness with which students confront these challenges is greatly influenced by the support systems they have access to. Students require a balanced combination of challenge and support to facilitate their learning and development. Excessive challenges without sufficient support can result in frustration and limited growth, while an abundance of support within challenging situations may impede students' ability to grow and learn effectively. Achieving the right equilibrium between challenge and support is essential for fostering optimal learning and development outcomes among students. To investigate our research question, reflective journaling is utilized, rooted in qualitative research methodology, which are acknowledged widely as a predominant means of documenting experiences within both professional and educational spheres [16]. Engaging in critical reflection on experiences arising from one's professional practice, conversations, or readings often results in the emergence of novel insights [17]. Lutz et al.'s [17] study focuses on the use of reflective journaling to examine the transition experiences of recent mechanical engineering graduates as they move from academia to the workforce.

Our research agenda is centered on conducting a pilot study to explore the experiences of international students through the reflective insights of faculty members. Utilizing a convenience sampling method, we recruited four faculty participants, including individuals who were formerly international students themselves and others who pursued their educational endeavors in their home countries before assuming faculty positions but now advise international students. Our primary objective is to gain an in-depth understanding of how faculty members navigate the intricate landscape of meeting the multifaceted needs of international students within the United States educational system. Employing an autoethnographic framework, our research engages in introspective reflection on the journeys of faculty members and their adaptive strategies in addressing the diverse needs of students.

Data Collection

Data was collected via reflection from each participant, who is also listed as an author, with the aim of not only learning from their experiences but also incorporating their perspectives into the research design. This inclusive approach enabled us to frame our inquiries based on a broader demographic of faculty members, rather than solely focusing on those who were former international students.

Our journaling prompts are categorized into four distinct criteria: Part One: Demographics. This section focuses on faculty demographics, and requests information, including gender identity, racial or ethnic background, current professional role, and university affiliation attached in Appendix A. Participants were asked to select options that best represent their identities and experiences, with the option to withhold information if preferred. Part Two addresses International Student Needs and Challenges, Part Three delves into Challenge and Support, and Part Four centers around Adaptation, and Development.

Part Two: International Student Needs and Challenges Context: International students studying in the United States encounter a range of challenges, such as dealing with visa regulations, managing financial limitations, adapting to a new culture, navigating academic disparities, potentially experiencing social isolation, and accessing healthcare services. Instances such as navigating immigration matters like Optional Practical Training (OPT), Curricular Practical Training (CPT), work authorizations, and sponsorship-related concerns that directly impact academics, transitioning internationally for job conferences or research endeavors, making decisions about career paths, and reaching out to companies for internships or full-time employment opportunities with sponsorship considerations.

TABLE I: The second journaling prompts distributed to faculty members

Part Two
International Student Needs and Challenges
Can you please share at least two specific instances where, in your capacity as a faculty member within the engineering program, you've identified and addressed the academic needs of international students? Additionally, could you elaborate on the approach you employ to cater to these diverse academic requirements?
From your experience, what are some distinct non-academic needs and challenges encountered by international students in the engineering department, and how do you adapt your support strategies to address these challenges and enhance the overall experience for these students?

Part Three: Challenge and Support Context: Nevitt Sanford, a psychologist in the realm of student development introduced two fundamental ideas: the cycles of differentiation and integration, and the equilibrium between providing support and presenting challenges. Sanford highlighted the journey of students as they explore their individuality and group affiliations,

acknowledging that unforeseen situations can be daunting. The extent to which students can effectively tackle these challenges is shaped by the support systems available to them

Part Four: Adaptation and Development Context: This section is to know some of the strategies you employ as a faculty member to effectively meet the diverse academic and non-academic needs of international students within the engineering program. Your insights can provide valuable guidance in enhancing the learning experience and support for this student demographic.

TABLE II: The third and fourth journaling prompts that were distributed to faculty members.

Part Three	Part Four
Challenge and Support	**Adaptation and development**
In your interactions with international students, to what extent are you familiar with these challenges that international students face? 1. Can you please share at least two specific instances where, in your capacity as a faculty member within the engineering program, you've identified and addressed the academic needs of international students? Additionally, could you elaborate on the approach you employ to cater to these diverse academic requirements?	In your role as an engineering faculty member, how do you customize your teaching and mentoring techniques to cater to the needs of international students? Could you provide specific approaches that you find effective in cultivating a supportive and inclusive learning environment? 1. Regarding the fulfillment of multifaceted needs, what institutional policies, initiatives, or structures do you think would most effectively support international students in the engineering program? How can higher education institutions enhance their support for faculty members in meeting the distinctive academic and non-academic needs of international students?

For data analysis, we intended to employ inductive coding, which followed a bottom-up approach [18]. This meant that we would not impose predefined structures or labels on the data. Instead, we would immerse ourselves in the information, allowing emerging concepts and patterns to surface naturally [19]. This approach would enable us to generate insights and theories directly from the data, making it particularly suitable for exploring new or less understood phenomena.

Results and Discussion

Through synthesizing responses gathered as part of the autoethnography, we realized that our team of authors had several shared experiences due to their identity of having been international students. For example, **<author 4>** in their reflection mentioned, "The challenges I faced on my

journey, from navigating a foreign education system to overcoming personal fears, have become stepping stones towards a lifelong commitment to education. Each obstacle was a lesson, molding me into someone dedicated to the betterment of students and the educational landscape as a whole." Similarly, **<author 5>** shared "The challenges and achievements I encountered during my time as an international student fostered empathy and a deep understanding of the diverse needs of students. It enhances my ability to connect with students from various cultural backgrounds, creating an inclusive learning environment. Additionally, navigating a new educational system has sharpened my adaptability and problem-solving skills, attributes that I bring to my role as a faculty member." **<author 6>** recommended, "Having advisors, especially for international students might help in providing specific guidance to international students and meet their specific needs." Through faculty reflection, the highlights of this exploratory phase reveal that higher education institutions can enhance support for international students by acknowledging the dynamic interaction between challenge and support. By doing so, institutions can adapt their services to meet evolving student needs, fostering a more inclusive and supportive campus environment conducive to student growth and well-being. We realized that lessons from this study need to be expanded to understand from faculty across disciplines and regardless of prior exposure to international student journeys of their experiences. As a research team, we are currently getting approval from our Institutional Review Board (IRB).

In Figure 1, We introduce a framework crafted to offer optimal support structures for international students. It's crucial to emphasize that this framework is still a Work in Progress, informed by the findings of our pilot study. We developed this framework by drawing upon faculty reflections in response to journaling prompts. The journaling prompts proposed below for future research represent a refined version of the responses provided by each author during the data collection phase. This ongoing work seeks to provide a comprehensive approach to address the unique needs of international students in higher education settings. Recognizing that our research centered on international student experiences, our preliminary explorations were autoethnographic, engaging with faculty members who either possessed personal experience as international students or were actively involved in advising, mentoring, or teaching such students, we collected data following our first developed protocol. For the next stage, drawing inspiration from [10] Paul et al.'s study focusing on faculty perceptions of the GRE as an admissions requirement, we will select faculty as research participants due to their pivotal role as the focal point of contact for international students enrolled in school.

Figure 1: Framework for optimal support structure Support of International Students (WIP)
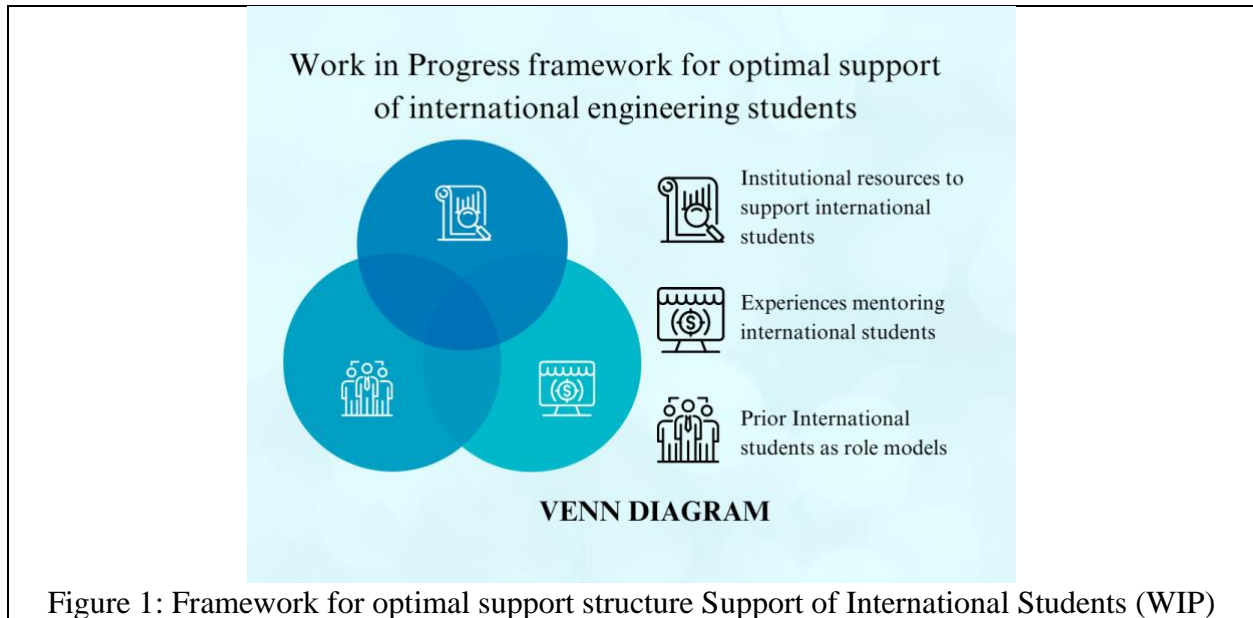
This data proved crucial in refining our journaling protocol and gaining a deeper understanding of our research questions. While acknowledging the validity and critique associated with our journaling protocol and gaining a deeper understanding of our research question. While acknowledging the validity and critique associated with convenience sampling, we opted for this approach to gather data, ultimately aiding in refining our protocol. Our research included faculty members from various US engineering programs, selected via convenience sampling. They, as co-authors, contributed valuable insights and feedback. Initially focused on international students' challenges, we realized the need for better context after receiving responses from participants not sharing those identities. This emphasized the importance of considering positionality in research, especially in studies concerning international students.

Future Work and Proposed Research Design

In the next phase of our research, we aim to secure IRB approval and establish recruitment criteria. Our recruited participants will be tasked with completing reflective journals probing into the research question, using the refined protocol tailored for this study to enhance support for international students in engineering. This protocol aims to gather comprehensive insights from engineering faculty members regarding their experiences and strategies in supporting international students, with the ultimate goal of improving the support system within the engineering department for this student population. Faculty members will receive journaling prompts, along with contextual information to guide their responses. To ensure the neutrality of our research design, we sought input from researchers who do not share similar identities as international students or faculty members, a key finding from our preliminary exploratory phase.

Conclusion

This paper presented preliminary themes collected as part of an autoethnographic reflective exercise by a team comprising faculty who themselves were international students, engineering professionals, and international graduate students. We recognize this study only captures insights from participants based in the US but believe that learnings can be extended to global engineering educators. Finally, this paper serves as a call to action to enlist participants for the next stage of our research to understand the challenges and support structures in place for international students in the US.

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Appendix A

Part 1: Demographic Questions

Kindly provide information about your gender, race/ethnicity, your current position, and the university to which you are currently affiliated.
    a) Gender:
          a. Male
          b. Female
          c. Non-binary
          d. Prefer not to say
    b) Race/Ethnicity:
          a. White/Caucasian
          b. Black/African American
          c. Hispanic/Latinx
          d. Asian/Pacific Islander
          e. Native American/Indigenous
          f. Multiracial
          g. Other
          h. Prefer not to say
    c) Current position:
          a. Faculty member
          b. Graduate student
          c. Postdoctoral researcher
          d. Administrator/Staff
          e. Other

d) University affiliation: <u>Please specify your current university.</u>

e) Length of tenure as a faculty member:
    a. Less than 1 year
    b. 1-5 years
    c. 6-10 years
    d. 11-20 years
    e. More than 20 years
    f. Prefer not to say
f) Were you an international student in the United States?
    a. If yes, how have your experiences as an international student influenced your role as a faculty member?