

Switching research labs: A phenomenological study of international graduate students.

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Abstract

International graduate students in engineering and science deal with cultural shock as they navigate and try to adapt to a new educational system in the United States of America (US) [1]. Many international graduate students deal with multiple challenges which some of their US national peers may not deal with [2]. For different reasons, graduate students may request to change from one research group to another [3]. Switching their research lab is complicated, often bringing many unknowns for the student. However, the experiences warranting a change and transitioning from one research group to another, often filled with trauma and stress, are peculiar for international students. With the additional challenges they have already been facing on campus, switching from one research lab to another puts more challenges on the everyday lives of international graduate students. International students, who join a new research lab and try to balance their research, course studies, and daily lives, have yet to be given a voice in the literature. We do not know the international graduate students' lived experiences in the new laboratories as they try to transition to the new lab's research work, cultural norms, and social interactions. In this phenomenological study, we describe the lived experiences of international graduate students as they pursue their academic and scholarship goals in a new research lab they switched to.

Introduction

International students contribute to the strength of the US economy and provide diversity and workforce strength in the education and industrial sectors. Post-COVID, the number of international students enrolled in the US increased by 17 per cent in the 2021/2022 academic year. An all-time high of 385,097 international graduate students was enrolled in the 2022/2023 academic year, representing an increase of 18 per cent. In the 2021/2022 academic year, international students came from 219 places of origin [4].

Some challenges international graduate students in the US struggle with are cultural adaptation, financial hardship, and isolation [2], [5]. Although many institutions enroll international students to meet the diversity quota, it was reported that resources needed for the successful integration of the students into the academic and social environment are either unavailable or not readily accessible for international graduate students [1].

Graduate school is often filled with research, professional, and social experiences. It has been reported that international graduate students value research-related and professional experiences more than their social experiences [5]. Research advisors have significant influence on whether graduate students will have a good sense of belonging and academic self-concept or not [6].

Some types of relationships or support that graduate students have may impact their overall level of fulfillment in graduate school. For example, the type of advisor-student relationship determines a graduate student's mental state, drop-out rate and success in graduate school and

career [7]. According to Nguyen [8], international graduate students have either a positive or a negative advisor-student experience. Students with negative advisor-student experiences may continue to stay in their program and not look for another advisor or research group because of the fear of retribution [8].

Examples of positive advisor-student experiences are perceived support and guidance from the advisors. In contrast, negative experiences are bullying, disrespect from advisors, long work hours, low salaries, prejudiced behaviors, lack of communication, and lack of feedback or helpful feedback [8], [9]. Sometimes international graduate students are reluctant to discuss their negative experiences with others because of the fear of retribution, losing funding, and immigration status [9].

Faculty members also have some challenges in their interactions with international graduate students, which are different from those with domestic students. International students may seek more guidance, depend on their advisors, and need more basic research skills [8], [9].

Purpose Statement

The purpose of this phenomenological study [10] was to describe the lived experiences of international engineering graduate students who had to switch to a new research group to complete their studies in the US. In this study, the lived experiences of the graduate students was defined as the meaning students attributed to their experiences and the description of their

physical, emotional, and psychological states as they navigated the new research laboratory and adapted to its work ethics and cultural and social norms.

Positionality

Researchers undertaking phenomenological studies must identify and articulate their positionalities [11]. Declaring our positionalities will help us set aside our experiences and focus on the research topic and process [12],[13]. The first author identifies as a female international graduate student at Southwestern University. She switched to a new research lab during her Master's program at a Midwestern University in the US. She felt that the new advisor supported her professional, physical, and mental goals when she was in the new lab environment. The third author had similar experiences. He started his graduate study in the northeast region of the US and was working in a research group in his first year. After a year, he decided to work with another advisor in the program. His new advisor was more supportive than the previous one. The second author was a domestic student in the US and did not change the research group during his graduate program. The second and third authors are advising international students in their current occupations.

Methods

The design of this study was phenomenological research. Phenomenology is a qualitative research method that explores and describes how several individuals define the lived experiences of a shared concept or phenomenon [10]. Some of the steps involved in phenomenological

studies are the following: determining that the phenomenological approach is the best approach for analyzing the research problem, identification of the phenomenon of interest, bracketing of the researchers, data collection, and data analysis [10].

The phenomenon under investigation was the experiences of international engineering graduate students as they joined a new research lab. Participants were recruited using purposeful, convenience, and criterion sampling methods [10]. The criteria for participating in this research were that participants were international graduate students in the US who were currently studying in the US and had at one time switched research labs or groups during their graduate education in the US. The participants were purposefully sampled because of their understanding and experience of switching to a new research group [10].

The approval of the Institutional Review Board was obtained for this study. The first and second authors facilitated recruitment through direct contact with three of the participants, while four of the participants were recruited through referrals from participants. After explaining the purpose of the research, the first author invited the participants to participate in the study and obtained their informed consent. The interviews were conducted over six weeks in the Fall of 2022. The interviews were conducted on Zoom and lasted between 30 and 45 minutes. The interview conversations were recorded and transcribed verbatim. The semi-structured interview protocol [11] was used as a guide for the conversations with questions centered on the feelings and emotions, perceived roles of the students, interactions with other lab members, and cultural norms in the new lab.

The first author analyzed the verbatim utilizing the constant comparative method [14]. Using Creswell's template for coding phenomenological study, she generated codes for bracketing, significant statements, meaning units, and textural and structural descriptions [10]. After this, she performed open, axial, and selective coding strategies for the analysis. In the open coding strategy, she read the transcriptions and simultaneously generated codes about the participants' lived experiences. By doing this, she generated as many codes as she could. In the axial coding, she re-read the transcriptions and then organized, merged, or grouped codes. She identified and deleted some unimportant codes. Selective reading was employed in the third reading. In the final stage, the main themes were formed.

To triangulate the findings, we performed member checking and peer auditing strategies [10], [11]. Peer auditing involves an external researcher or a team of researchers not involved in the study. The peer auditors review the research process, data collection, analysis, and interpretation of the data to provide feedback and insights to the original researchers. Peer auditing helps to validate the researchers' findings by enhancing the accuracy of the analysis. An engineering education PhD student, who was not involved in the research study, conducted a peer audit of the anonymized interview transcripts, the coded themes, and the results to validate the research findings.

Member checking is a qualitative research technique that involves returning the research findings to the actual participants to verify their accuracy and provide an opportunity for feedback and a second opinion [10]. We shared our findings with the seven participants to confirm that our interpretations of the data were consistent with their lived experiences and perceptions. Our aim

was to enhance the credibility and trustworthiness of the research findings by ensuring that they accurately reflect the participants' perspectives. Five of the seven participants responded to our request and informed us that the experiences and perceptions we reported were accurately captured and documented. Two participants did not respond to us.

Participants

The study participants were seven international graduate students majoring in Sciences and Engineering. All seven participants were older than 18 years of age. They were pursuing graduate studies at public research universities in the US at the time of data collection. Six of them were PhD students, and one of them was a Master's student. The demographic characteristics of the participants are shown in Table 1.

Table 1.

Demographics of Participants

Participants (Pseudonyms)	Country of origin	Program of Study, Major	University Location
Irene	Philippines	PhD student, Material science and chemical engineering	Southwestern US
David	Turkey	PhD student, Mechanical engineering	Southwestern US

Jessica	Nigeria	PhD student, Biochemistry	Midwestern US
Elaine	Iran	PhD student, Food science	Southwestern US
Mary	Nigeria	Masters student, Civil Engineering	Midwestern US
Melanie	Mexico	PhD student, Food science	Southwestern US
Kelly	Nigeria	PhD student, Engineering	Southwestern US

Results

All participants in this study reported that they were well-settled in the new research lab. For example, Mary described her feelings in the new lab as “*happy, confident, and hopeful.*” Even David, whose switching to a new lab was due to the retirement of his previous advisor, has settled in well with the new advisor. “*Yeah, I think we aligned well, which is like the research interests [including] my working schedule...[I] have not had any problem with him.*”

Two participants changed labs because of the retirement of their previous advisors, and both believed that they would have preferred working with the previous advisor over changing advisors.

Emerging Themes

1. Time lost

Graduate students who switch to another lab may have to do research work that is different from their previous work and may have to start afresh in their research program. Starting afresh with research may result in extending their expected graduation time. The time spent in the previous lab may not be recoverable. Most of the participants in this study, except Jessica, who switched in the first year of her graduate school, reported that they were impacted by the extension in graduation time. David had one year left to graduate when he switched to a new research group because of his advisor's retirement. Joining a new research group extended his research objectives and resulted in an additional year to graduation. According to David,

"The direction of the project changed and it affected me because I was originally more focused on doing simulations. But then [the new advisor's] expectations of me changed. [The new advisor] expects me to work more on more experiments... So, it extends my research."

When asked if he would have graduated by the expected time if he was with the previous advisor, his response was, *"of course, I would graduate faster, and I would be happier ..."*

In the US, international students may have funding from fellowships, government funding or grants from advisors. In this study, Melanie was the only international graduate with funding from her home country. We found that the extension of graduation also affected her. Fortunately, there is a provision for an extra year in her scholarship to complete her program. As a result, she was not affected financially by the extension. According to Melanie, regarding the extension of graduation,

"I already lost one year. So, my program is for three years, and my scholarship is for four years. So, I am going to be able to finish in four years...Supposedly, because I have a Master's [degree], it would be three years, but one can always extend, so I am still going to do the four years."

For Elaine, it was a loss of one year because apart from the coursework, the research from her previous lab did not count towards her graduation. In terms of her research, she had to start from scratch. She said, *"I lost one year of my PhD, actually. I just did some coursework. But except [for] those [previous] coursework, everything I had done in the[previous] lab, I lost all of them."*

Students in the Master's programs have a shorter time for research than doctoral students.

Starting afresh in a new lab also translates to extended graduation time, even for students in Master's programs. When Mary was asked if she would have graduated earlier had she started with the current advisor, she replied, *"Yeah, I would be so sure that my graduation would be in Spring, and I would even have better grades."*

2. Supportive Advisors

According to most of the participants in this study, the new advisors are more supportive. However, each graduate student's perception and definition of support differ. For example, Irene defines the support she receives from her new advisor in terms of accessibility and guidance that is devoid of micromanagement. According to Irene,

"My [new] advisor is a hands-off [advisor]. Nevertheless, he consistently tells us[that] if we need him, we could email him or set up a Zoom meeting. Or he can go to the lab just to help us. But he is the type of person that lets the student, I think, create their path. So if I get stuck on something, he is going to give me tips, he is going to give me advice on how to do it. But most of the time, it feels like it is my work. Not many students would appreciate that,[but] for me, that is the type of working style that I really want: To have this control over my project and to have my advisor right there with me to support..."

Melanie feels supported by her new advisor because of shared similarities in working styles. For example, she said,

"yes, I think I get along pretty well with her. We are very similar in things such as perfectionism, we like to be [at the lab] all day, and we want things to be done well. So, we are compatible. Another thing is that I like controlling things, and she also likes that. And so, because of that, she will stay with me until an experiment is done. And for me, that is not pressure. It was like, "Wow, she is helping me". So she will sometimes go inside of the hood with me to do the sterile work. Some people do not like people being involved

in their research. But in my case, it is like moving from an advisor that was not involved to a PI that puts her hands on my work. It is great. It is a lot of help."

In this study, most participants were more confident of their professional development in the new lab than in their previous labs. Some examples of support are related to professional goals. Mary said

"So, of the experiences, I would say I am growing more. My advisor sends me opportunities. I can talk to my advisor about my goals. He helps me do stuff like adjusting my CV. I am able to call him to discuss with him about anything. And I have had more opportunities for professional development and personal development."

Also, students feel supported by the display of professionalism from their new advisors. For example, Elaine's description of support is that *"he [is] so supportive, and also, for example, when you go to his [office], he gives you time to express your idea. He does not cut your word[or] your speech and does not judge you."*

In the previous labs, students did not have a sense of mental or emotional support from their advisors. Working for long hours negatively affected their mental health and resulted in a lack of professional growth or self-worth. Mary, who considers herself hard working, reports that working with her previous advisor negatively impacted her physical and mental health. When asked about her feelings in the previous lab, she said

"So, personally, I was not growing. I felt like I was not confident... I was being treated in some way that made me question my worth. I felt like I was overworked. I felt like I could

not talk to my advisor and was scared of my advisor. And I just needed to leave that place because it was already affecting me physically and mentally."

Similarly, For Elaine, her description of her former advisor is

"like a boss.... does not have any sympathy ... just wants the result. I [had] a [research-related] problem, explained it to him, and asked how to fix it. He replied that" You should just fix it. Go to the library, and you find a solution to your problem. I cannot help you. But you have to get me the result". It was terrible. It was terrible."

When asked about how she felt about working with the new advisor in comparison to her former advisor, Jessica said, *"Well, I think I am fine right now. I have been worse; it can be worse..."*

3. Peer support

Participants reported positive relationships with other graduate students in the new labs. In this study, the diversity of their research team members did not have any negative impact on the participants. Participants had positive professional relationships with other graduate students in their research team. We define the term diversity in this study as the "number of nationalities and backgrounds in the research group". For example, a diverse research team has two or more members who are from different countries, regions, or continents around the globe. A lab team can comprise graduate students from different backgrounds and nationalities working on similar or different research projects. For example, Irene reported us that in her new lab:

"With my colleagues, we are all working on different projects.... But there is this sort of camaraderie as well. We set up bi-weekly meetings, just hanging out and not even talking

about research at all, which helps to feel that team camaraderie between us. So, I kind of like this environment."

For Jessica, in her new lab, there are clear expectations, and all team members strive to meet up. Jessica said,

"I would say it is good because we understand ourselves... We interact well. You know what you are supposed to do, and the other person knows what they should do.[There are] no hiccups or questions about someone not doing what they are supposed to do or someone being in your face. So, there is a healthy relationship workflow."

Elaine did not have a good relationship with the team members in her previous lab. While describing the previous lab, she said,

"The other students in [my previous] lab did not behave friendly...the ambience was so pushy for everyone. [The graduate students] They do not like to support each other; they do not like to help each other, and it was such a stressful ambience for everyone in the lab. The trust was zero in this lab."

She stressed the importance of joining an ethnic-diverse group:

"It is so important to join an international lab. At [the] previous lab, it was only one nationality. I felt so out of place. And I think no one [could] understand me, and I [could not] understand anyone as well."

Most participants highlighted a cordial and professional relationship with their fellow graduate students. However, comparing the most important professional relationship between advisors and group members, few participants consider the relationship between the advisor to be more critical than working-relationship with other graduate students in the research group. Elaine further stressed the importance of a great professional relationship with her advisor over her lab members:

"my lab mate is not [that] important. Because if I have a problem or an issue, the first person I expect to explain is my professor, and the only person who can help me is my professor."

Discussions

In this study, seven international graduate students in the US described their experiences in a new research group they switched to after leaving a previous research group. All the participants reported doing well in their new labs. The participants who had an active role in the choice of their advisors all report feeling better supported by their new advisors. Their description of support covers accessibility, professionalism, and mental and professional support. Although, two participants whose original advisors retired did not have an active role in choosing their new advisors. Still, these two participants report working well with their current advisors but would have preferred working with their previous advisors.

Most participants' graduation time is extended due to lost time from the previous lab and a fresh start in their new labs. An extension of graduation time is a possible fear international graduate

students may have when considering switching research labs. Looking into this fear may be a future consideration for research.

Our participants reported that they liked the working style of their new research advisors. While some research advisors provide support and guidance, allowing students to be stakeholders in their work, others prefer micromanagement. According to Blanchard and Haccoun [15], micromanagement may negatively impact graduate students, but it may be appropriate for students with stronger avoidance goal orientation. As noted by Adrian-Taylor, Noels, and Tischler [9], significant mismatches international graduate students report is in terms of personality, work style, communication preferences, or values. Given this, new international graduates must be provided with resources and guidance to increase their awareness of the different personalities and working styles as they navigate and integrate into a new education and work culture in the US. Provided resources and guidance can help reduce the emotional and physical trauma of switching research labs. Hence, students will not waste their valuable time to adjust to the new working culture in the research lab. This enables them not to postpone their graduation. The university administrations can design and offer professional development activities for the graduate advisors who work with international graduate students in their research labs. In those professional development sessions, faculty could be provided with guidelines and standards about how to effectively supervise and advise international students in their newly joined work environment.

Particular emphasis can be given to the international students' relationship with the research lab members. However the impact of the research team culture on international graduate students'

success may not be as crucial as the professional relationship with advisors. The influence of a positive advisor-student professional relationship on graduate students' success has been reported by Cantwell Lee, and Mlambo [16]. They reported that research-related and professional experiences are more important to international graduate students than social experiences. Hence, having a good working relationship with a research advisor may override the team relationship effect. International graduate students may not consider relationships with their fellow graduate students as a factor for their success in their studies.

We are curious to know if having a say in the choice of a new advisor and external scholarship determines the level of satisfaction of international graduate students when they switch labs. For example, for David, the choice of a new research group and advisor was not in his control; hence he was doing everything to make the best of the working relationship with the new advisor for him to graduate. David said about the new advisor, "*Maybe he was nicer to us because of the transition. We did not choose that path. We had to be on that path.*"

Study limitations

A limitation of the present study is the underrepresentation of Asians in the research study. In 2021/2022, international admissions comprised 69 % Asian [4]. Also, the participants are from only three universities in the US and may not represent the voices of all the international graduate students in the US.

Another limitation is that the study participants were only those who were still in graduate programs. They reported that they were doing well in their new research groups. We did not have participants who did not do well in the new lab groups. Exploring and documenting the experiences of the international students, who were not able to continue their graduate studies and quit their education, would add different perspectives and enrich the findings of this study.

Future work

Different research advisors are at different levels in their academic career paths. Graduate advisors' academic status and their years of experience in advising students will have an impact on their relations with their international students. Exploring the advisors' varied academic status and their international students' lived experiences in the newly joined research labs will provide additional findings. A future work will involve different advisors and their international graduate students' lived experiences.

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