

Frontiers: The Interdisciplinary Journal of Study Abroad

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Volume 36, Issue 3, pp. 204-233

DOI: 10.36366/frontiers.v36i3.857

www.frontiersjournal.org



Developing the Cultural Competencies of Preservice Mathematics Teachers: A Case Study from Education Abroad

Blair IZard¹, David M. Moss²

Abstract

The lack of support for equitable learning outcomes is a long-standing issue in mathematics education. As there has been significant attention from professional organizations to address issues of access and equity within mathematics education, there has been an emphasis on creating classrooms that are responsive to students' backgrounds, experiences, cultural perspectives, and traditions. However, this is nearly impossible without the ability to first see culture and recognize the backgrounds and lived experiences of others. This study reports on an approach to developing the cultural competencies of preservice mathematics teachers—education abroad—with the notion that as teachers develop a sense of culture, they will have the potential to place it front and center in their instruction. Following one preservice teacher's journey through a semester-long education abroad program, we find that education abroad can positively influence cultural perspectives and philosophies of mathematics teaching.

Keywords

Education abroad; mathematics; preservice teacher education

1 SUNY EMPIRE STATE UNIVERSITY, SARATOGA SPRINGS, NY, UNITED STATES OF AMERICA

2 UNIVERSITY OF CONNECTICUT, UNIVERSITY OF CONNECTICUT, UNITED STATES OF AMERICA

Corresponding author: Blair IZard, blair.izard@sunyempire.edu

Date of Acceptance: June 25th, 2024

1. Introduction

In June 2020, several mathematics education organizations published statements in support of the Black Lives Matter movement. For example, the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA, 2020) updated their Equity Statement to state, “Mathematics educators’ work for equity is not enough if their work is not specifically anti-racist and focused on action to dismantle racism as it exists in our schools, institutions, and even our own organizations” (p. 5). TODOS: Mathematics For All (2020) recommitted to dismantling racism within mathematics education by challenging beliefs that perpetuate microaggressions. The Association of Mathematics Teacher Educators emphasized, “We must learn ways to empower and provide access to students who often are judged by the color of their skin and not by their knowledge and abilities,” and that we must foster mathematics teachers who “implement practices that draw on students’ mathematical, cultural, and linguistic resources/strengths” (AMTE, 2020, p. 2).

While these statements reflect a more recent commitment to Black Lives Matter and racial justice, issues of access and equity are not new to mathematics education. Gutiérrez (2007) has argued that students of color are forced to downplay their personal, cultural, and linguistic identities in order to participate in the mathematics classroom. Furthermore, she has argued (2002) that mathematics teachers often see students’ racial and cultural experiences as insignificant in the learning of mathematics, likely because the subject is frequently characterized as a universal language, and as such, culturally neutral. She explains, “Most mathematics teachers are not well versed in how culture and language can relate positively to student learning” (2002, p. 1049) and that we must help teacher candidates “recognize that not all students are like them” (2007, p. 11) in order for them to begin incorporating their students’ backgrounds into their classrooms. Similarly, the National Council of Teachers of Mathematics (NCTM) (2014) has suggested that to promote a culture of access and equity, teachers should be “responsive to students’ backgrounds, experiences, cultural perspectives, traditions, and knowledge” (p. 1).

These calls for change are a move away from the more traditional approach of mathematics education, in which the subject is often taught without much connection to students’ lives. To truly support the movements like Black Lives Matter and address deep-seated issues of access and equity within mathematics education, mathematics instruction must be centered on students’

culture and lived experiences. However, this is nearly impossible without the ability to first *see* culture and *recognize* the backgrounds and lived experiences of others. As such, we need mathematics teachers with cultural competencies. In other words, we need mathematics teachers who 1) see themselves as cultural-bearing beings, 2) recognize their students' cultures, and 3) have the ability to communicate and work across cultures. This study reports on an approach to developing the cultural competencies of preservice mathematics teachers through education abroad experiences. We argue that once teachers develop a sense of culture, they will have the potential to place it front and center in their instruction.

Although there are many viable pathways to provide preservice teachers with perspectives on culture, research from education abroad programming has shown that when students are immersed in a culture other than their own, they can develop a sense of cultural awareness and the capacity to work across cultures (Marx & Moss, 2011; Phillion et al., 2009). They can “challenge their beliefs about the world and its people, develop empathy for and trust in others, learn a significant amount about at least one other culture, and often to their surprise, learn quite a lot about their own culture” (Cushner, 2009, p. 160). Students also report that these experiences create a sense of open-mindedness and a better understanding of their home culture (Shiveley & Misco, 2015), and they demonstrate an increased level of intercultural competence following the experience (Heinzmann et al., 2015). Much of this learning comes from the experience of feeling like a cultural outsider while being immersed in a new culture (Medina et al., 2015; Merryfield, 2000) and from explicit guided discussions and reflections about cultural difference (Moss et al., 2020).

With that said, research on education abroad has also shown mixed findings. When participants approach education abroad focused solely on their own learning with an intent to observe or consume another culture, ethnocentric viewpoints and United States (US) American exceptionalism can be reinforced (Nyunt et al., 2022). Further, when cultural learning does occur, students may struggle to connect their learning abroad to their experiences back home (Nyunt et al., 2022). In particular, short-term study abroad—that is, programs that occur in the summer or that are eight or fewer weeks during the academic year—has been found to be problematic. Short-term study abroad has the potential to strengthen cultural stereotypes, promote neocolonial attitudes, and reinforce US superiority (Zemach-Bersin, 2007). One reason that

miseducation and a lack of cultural learning can occur during these shorter-duration programs is that they often have limited opportunities for intentional immersion within the host culture (George Mwangi & Yao, 2021). The education abroad program described here was created with these challenges in mind, and in the methodology section, we will discuss how the program was designed to mitigate these concerns.

Seeking to understand the ways in which education abroad experiences might prepare mathematics teachers to develop cultural competencies, we explored a preservice mathematics teacher's cultural development across the arc of a semester-long education abroad program in the United Kingdom (UK), that included pre-departure and re-entry experiences. Our aim was to learn about the experiences of a preservice mathematics teacher who participated in an education abroad program. Thus, this study explored the following research questions:

- (1) In what ways does the experience of participating in an education abroad program influence the cultural perspectives of a preservice mathematics teacher?
- (2) In what ways might their philosophies of mathematics teaching shift through participation in this program?

2. Conceptual Framework

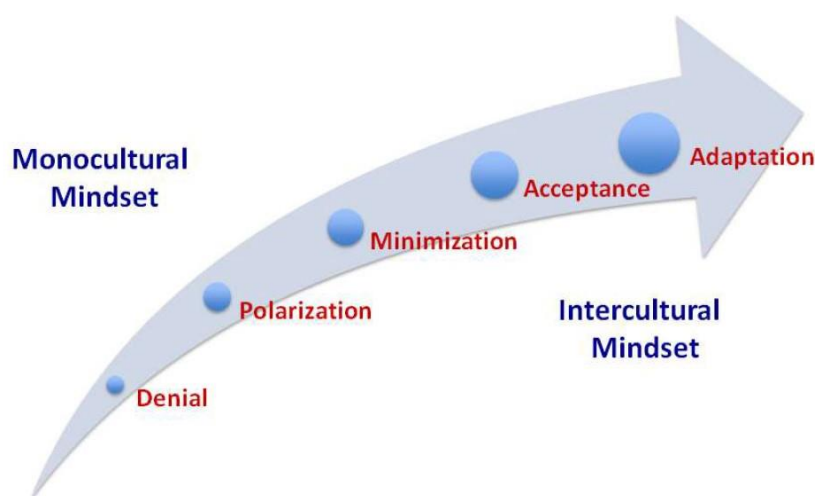
The Developmental Model of Intercultural Sensitivity (DMIS) (Bennett, 1986) provides a framework for understanding the development of cultural awareness and, specifically within the context of this study, the ways in which a cross-cultural experience might shift preservice teachers toward being more culturally aware and sensitive. The developmental framework highlights a continuum of ways in which one can respond to cultural difference, ranging from *monocultural* to *intercultural*. Monocultural responses, as defined by Bennett (2004) are “the experience of one’s own culture as ‘central to reality,’” in which a person evaluates other cultures according to their own culture, using broad stereotypes to identify cultural difference. In contrast, intercultural responses are “the experience of one’s own beliefs and behaviors as just one organization of reality among many viable possibilities” (Bennett, 2004, p. 62). People in the intercultural stage value cultural difference and use it as a lens for understanding conflicts and miscommunication. They are also aware of the ways in which culture influences behaviors and beliefs. We hope to instill

mathematics teachers with intercultural mindsets which we believe are a prerequisite for incorporating students' culture and backgrounds into the classroom.

There are two categories in the monocultural side of the continuum (denial and polarization), two categories within intercultural (acceptance and adaptation), and a category (minimization) which is considered transitional between monocultural and intercultural. Figure (1) is an illustration of the continuum.

FIGURE (1)

INTERCULTURAL DEVELOPMENT CONTINUUM



SOURCE: HAMMER (2012, P. 199)

Denial is the first category on the monocultural side of the continuum. Someone in this category would view one's own culture as the only real one, and other cultures would be "construed in rather vague ways" (Hammer et al., 2003, p. 424). Because of this, a person in denial has trouble seeing cultural differences and may avoid situations where people with cultural differences are present or withdraw when they exist. Following denial is *polarization*, which indicates a recognition of cultural difference with an "us-them" mindset. This can take the form of "defense" (not being critical of your own culture but being overly critical of other cultures) or "reversal" (being overly critical of your own culture and not critical of others). Someone in polarization typically feels uncomfortable around cultural diversity.

Minimization is seen as a transitional category, moving from a monocultural to an intercultural perspective. While a person in denial and polarization often feels uncomfortable around cultural difference, a person in minimization may welcome it; however, this category is not considered “intercultural.” A person in this category minimizes cultural differences, focusing on similarities and what people have in common, rather than the differences that may exist. Someone in minimization “is typically “color-blind,” focusing on commonalities and universal values, emphasizing similarities, and holding the belief that all people are fundamentally the same” (Cushner, 2009, p. 156). Therefore, when minimization is coming from a dominant cultural perspective, diversity usually feels unheard or unrecognized.

Acceptance is the first category on the intercultural side of the continuum, and it involves recognizing and appreciating cultural differences such as values, perceptions, and behaviors both within one’s own culture and across cultures. Someone in this category would “experience others as different from themselves, but equally human” (Hammer et al., 2003, p. 425). At times, cultural difference could still be judged negatively, “but the judgment is not monocultural in the sense of withholding equal humanity” (Hammer et al., 2003, p. 425). Someone in this category would consider one’s own culture as one of many equally complex worldviews.

Adaptation goes beyond acceptance: it not only recognizes and appreciates cultural differences; it also demonstrates a shifting of cultural perspectives and behavior that are appropriate to the culture in which one is interacting. Hammer et al. (2003) write, “People at adaptation can engage in empathy—the ability to take perspective or shift frame of reference vis-à-vis other cultures,” and “this shift is not merely cognitive; it is a change in the organization of lived experience, which necessarily includes affect and behavior” (p. 425). In this stage, individuals become more competent in their ability to communicate across cultures.

The Intercultural Development Inventory (IDI) (Hammer & Bennett, 1998), grounded in the theoretical framework of the DMIS, is a validated instrument that measures a person’s orientation to cultural difference across this continuum. Essentially, it places respondents along the DMIS continuum. Studies using the IDI have shown that teachers generally lack intercultural sensitivity. For example, Mahon (2003) studied 155 teachers in the Midwestern US and, using the IDI, found that 100% of them fell at minimization or below.

However, other studies have used the IDI to show that education abroad programs can move preservice teachers along this continuum, putting them in a place where they have higher levels of intercultural sensitivity (Marx & Moss, 2011). If we want mathematics teachers to center instruction on students' culture and experiences, then we should provide them with experiences that help them explicitly learn about culture, and an abroad experience appears to be a viable experience. We have found that the DMIS is a useful framework for considering educators' cultural learning. As such, this study uses the DMIS as a framework for understanding one preservice mathematics teacher's experience throughout an education abroad program in the UK to determine how that experience fostered cultural awareness.

3. Methodology

The purpose of this study was to describe and interpret the cultural development of one preservice mathematics teacher throughout a semester-long education abroad program in the UK. This education abroad program was a component of a five-year integrated bachelor's/master's teacher education program facilitated through a university in New England, occurring during the fall semester of students' master's year in the program. The university offers a suite of semester-long education abroad experiences (Moss et al., 2020), with this particular experience designed for preservice mathematics teachers to develop both their cultural understanding and their mathematics teaching knowledge.

We conducted an embedded case study, with the education abroad program being the main case and each student participant of the program being a smaller case within it (Yin, 1984). Four students participated in this program, and in this paper, we report on the experiences of one of those four students. Ben, a pseudonym, presented what we theorize as a "critical case" (Yin, 1984). Ben served as a critical case because, while he is a male in what is often perceived as a primarily female profession, his demographics closely aligned with the demographics of the majority of teachers in the United States. According to the National Center for Education Statistics (2023), 80% of the teaching force in the United States are White and middle-class, and Ben identified as such. Additionally, he only spoke English and was raised Christian (although he did not seem to strongly identify with this religion); he grew up in a suburban majority-White town within an hour from the university; and he

had limited intercultural life experiences, admitting that he had not “experienced cultures that were vastly different” from his own.

3.1. Program Description

This education abroad program was designed with pre-departure and re-entry experiences as necessary components (Byram & Feng, 2006). The program spanned an entire calendar year beginning the summer before departure to the UK and extended into the spring semester in which students took a re-entry seminar at their home institution. Students were provided support and opportunities for reflection before, during, and after their semester abroad. As this program was designed specifically for preservice mathematics teachers, while abroad, students took mathematics education classes at a university that is well known for its research in mathematics education, and they participated in a split internship—spending two days per week working in a mathematics department at a local school and one day per week working with mathematics education researchers at the university. These experiences offered many opportunities for immersion within the host culture that focused specifically on mathematics education, allowing students to develop an understanding of how mathematics is viewed differently across cultures.

During their semester abroad, students also took a seminar class through their home institution. This course provided a space for students to make sense of their experiences abroad. The instructor met virtually with the students once per week and visited them in the UK near the mid-point of the program. The first author of this study was the instructor for this seminar course through the home institution, as such, it is important to note her positionality within this study. As their instructor, she helped guide their thinking throughout the program, encouraging them to reflect and grow throughout the experience, and when she noticed that one of them was struggling with something specific, she provided readings and in-class discussions to help them work through their thoughts. In this sense, she helped guide their thinking, and ultimately, influenced the outcomes of the study. As such, it must be acknowledged that her positionality was a limitation of this study; however, she sought to address this by using triangulation and multiple sources of data.

3.2. Data Collection

Given that this was a detailed investigation of a particular experience, the use of a qualitative design offered the possibility of uncovering and

describing key aspects of Ben's experience (Grbich, 2013). We considered the data longitudinally to gain insight into the growth and development of Ben through the entire year-long experience, and data was collected from multiple sources in order to provide a "thick description" (Gertz, 1973). A case report was developed throughout the study, with the report serving as the foundation of the within case phase of analysis (Mills et al., 2010).

Three main data collection methods were used allowing for a holistic exploration of the research questions: interviews, the IDI, and document analysis of student journals and coursework. There were three phases of data collection. Phase 1, the pre-departure phase, occurred the summer before students left for the UK. During this phase, we conducted the first interview with each participant in the program and had students complete the IDI. The second phase of data collection occurred while the students were abroad. In this phase, the first author visited the students abroad for about a week, and during this time, she conducted the second interview. Throughout this entire second phase of data collection, we also continued to collect journal prompts written by each of the students. Phase 3 occurred at the start of the spring semester, after students had returned to the United States. Throughout this time, we met with each student for the final interview and students responded to their final journal prompt. They also completed the IDI again so there could be a pre- and post-comparison.

3.3. Data Analysis

To analyze the data and understand Ben's experience throughout this program, we started by coding the data using in vivo coding (Saldaña, 2016). We kept our research questions in mind as we wrote codes in the margins of each document; whenever we read something that related to mathematics teaching or cultural learning, we made sure to code it. Once we finished coding the documents, we wrote all the codes onto individual index cards, with the location of the code noted so that we could go back to the original data source when necessary. Once all the codes were written on index cards—eventually there were hundreds of codes—we separated them by research question, so there were three different piles of index cards. Then, we organized similarly coded data into groups or categories that shared similar characteristics and attached labels to these groupings. For example, "I do not identify with any of the generalizations of U.S. Americans," "I do not really consider myself U.S. American," and "Maybe some of my ideologies line up with the stereotypical U.S.

American but that might not be why I feel that way,” all fell into the category labeled “I do not identify as U.S. American.” Once we finished grouping similarly coded data into categories, we typed the codes into a table so that we could easily see all the groupings and the label, or category, for each grouping. Finally, we organized the categories chronologically to compose a story of the participants’ evolution of thinking across the program experiences. In the following section, we share this story.

4. Results: Ben’s Story

Ben is a White man who turned 22 years old during his time abroad. He grew up in a small rural town in New England. Prior to studying abroad, he admitted that he did not have much experience with vastly different cultures. He described his hometown as mostly White and ranging from “lower-middle-class to upper-middle class,” and he shared a story of having one Black friend in elementary school who moved away because his mother felt he was being discriminated against by teachers in school. Ben described that his peers in school “saw each other for who they were.” What is your personality? Are you a funny person? What sport are you good at? These were the ways they judged each other, rather than acknowledging cultural or racial differences. In fact, he also shared that in 3rd or 4th grade, his mother asked if he noticed anything different about his Black friend, and after thinking for a minute, he said, “Oh, his hair is different,” which appeared to represent Ben’s way of seeing others throughout his childhood and teenage years. He shared that he used to wonder why everyone did not learn a single common language, because, as he put it, “One language would make it significantly easier for everyone to communicate,” and he considered this a logical way of viewing language. He looked back at his high school days and was aware that he was less interested in the differences that existed between people. As he put it, “I thought, people are just essentially the same, and they are so different that it does not really matter because their differences kind of line up.” He mentioned that he felt this way about culture too.

4.1. Ben at the Start of the Program

When we sat down with Ben for our first interview, he had trouble describing himself and his culture. He described himself as “Caucasian,” “Polish,” and “Italian,” but indicated that these were not identities his family prided themselves on or felt connected to. Instead, he described how “culturally, it

would be more accurate to say my family is a family of helpers over any specific background because my mom is an occupational therapist and my dad is a teacher in an elementary school.” He acknowledged that his family was privileged to not have to identify with “race,” or “culture,”—they could identify with something else entirely, like being “helpers.” When we asked him if there were any organizations, events, or other affiliations that helped define who he was, he discussed that marching band was probably the biggest definer, saying, “I’m very much into music.... I listen to everything from rap to jazz to rock.” He said that he had many close friends from the marching band. He indicated that there was not much else he really identified with.

Ben discussed that he did not really consider himself US American, and that he had trouble determining what it meant:

Ben: I guess I consider myself American in the sense that I was raised in America, but I feel like America is too broad of a thing for me to consider myself as... So, like, I would say in a manner of speaking, I identify as American because I grew up in America. But I don’t really identify with anything that I know could be a generalization of Americans.

Interviewer: So, what do you think it means to be American? To you, does it just mean being born here and living here?

Ben: To me, it only means being born in America. But that doesn’t mean that it means that to other people. Maybe there are some things that line up with my ideologies that line up with what someone might think a stereotypical American is, but that doesn’t mean that’s why I feel that way. So, I don’t know.

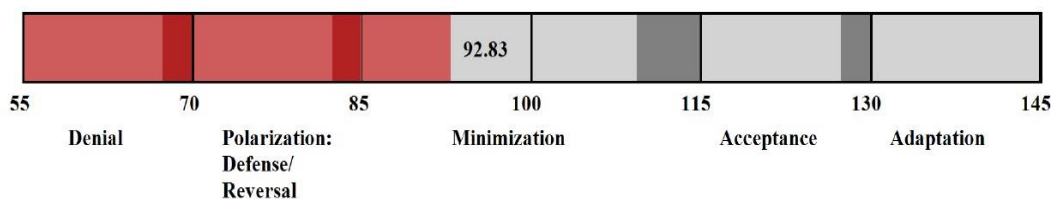
To Ben, America was too multifaceted to generalize, and he had trouble articulating what it meant to be US American. These ideas also came up in the short-answer section of the IDI questionnaire, where he discussed that the United States is a huge country consisting of millions of people. Although he had the incorrect population of the US (6 million; rather than about 332 million), his point was that “[t]here may be things those six million people in the US share, but a majority of those people have vast differences. The culture of the US is close to not being generalizable at all.” This is particularly interesting from Ben, because while he described himself in high school as being someone who thought people were essentially the same and did not seem to notice their differences, by the outset of this study he had evolved into someone who was aware of the differences that existed between people. He now reasoned, “We

can consider region by region, state by state, city by city, there are significant cultural differences... . Even each and every high school in the country has its own culture, norms, and precedents that change the way individuals think.” Ben ultimately argued that “systems are set up by the individuals at the end of the day, rather than the cultures themselves.” This became a recurring topic for Ben. He preferred to think of people as individuals and felt there was no positive value from noticing their culture. As he wrote in the IDI, “Generalizing cultures, in my opinion, is a bad thing as it takes away the ability for the individual to be themselves.”

When Ben first completed the IDI, his developmental orientation indicated that his primary orientation towards cultural difference was within minimization, with the exact number being 92.83 (see Figure 2). As reported in his IDI profile, minimization reflects “a tendency to highlight commonalities across cultures that can mask important cultural differences in values, perceptions, and behaviors,” (Ben’s IDI profile, pg. 6).

FIGURE (2)

BEN’S INTERCULTURAL DEVELOPMENTAL ORIENTATION (PRIOR TO THE PROGRAM)



At the beginning of the program, Ben focused on differences, but this was in the form of looking at differences among individuals, rather than differences among cultures. Ben avoided culture as a lens by which he framed his world because he felt it would prevent him from understanding the individual person at hand. We believe that because he lived within a dominant cultural group in America, this perpetuated this way of viewing the world. That is, he could choose to ignore culture. He could choose to be viewed for his individual traits rather than his cultural traits, and in turn, he focused on the individual traits of others, unaware that individual traits are profoundly influenced by cultural values.

Ben’s views correspond with Helms’ Model of White Identity Development (1984) that suggests White individuals can more readily avoid working through issues of racial identity development because of their

sociopolitical power and privilege. The model consists of two phases; each phase is composed of three stages. At this point in the program, Ben demonstrated characteristics of the very first stage of White identity development: *contact*. Contact is “characterized by an innocence and ignorance about race and racial issues” in which the individual is “not consciously White and assumes that other people are “raceless” too” (Helms, 2004, p. 5). The individual has likely existed in primarily White environments, has had limited contact with people of color, and has not had to think about their Whiteness. It is common for individuals in this stage to not see color and believe they treat everyone equally. All of these characteristics align with Ben’s beliefs at the beginning of the program.

A pivotal moment in Ben’s cultural development occurred when he received his IDI report and saw that his developmental orientation fell within minimization. At this point, he became aware that he was not noticing cultural differences, and this became a constant point of reflection for him throughout the semester. He decided one of his goals in the UK would be to look for differences between cultures. In this sense, the IDI itself served as a catalyst for cultural growth and prompted interest to learn about other races and cultures. Further, Ben appeared to be willing to enter the second stage of Helms’ Model of White Identity Development: *disintegration*. This stage is entered when it no longer works to deny the existence of race.

During the summer course, Ben also wrote about his philosophy of mathematics teaching. Some of his descriptions aligned with highly-regarded approaches to teaching the subject. For example, he reflected on how he valued an inquiry approach and a focus on conceptual understanding, practices that are valued in the field (Iannone & Cockburn, 2008; Pratt & Woods, 2007); however, his descriptions did not include a recognition of “students’ backgrounds, experiences, cultural perspectives, traditions, and knowledge,” (2014, p. 1), which NCTM has said is necessary in order to promote a culture of access and equity. In fact, he barely discussed his students. Instead, he focused on what he valued within the subject, demonstrating a monocultural mindset within his teaching. He also did not have a sense of how mathematics is taught in other countries and expressed an interest in learning more about this. His philosophy of mathematics teaching evolved throughout the program, and later in the manuscript, we will discuss some of the ways in which his philosophy changed.

4.2. Arriving in the UK

When Ben first arrived in the UK, he seemed to experience a honeymoon phase. After being there for a week, his journals indicated he was having a “fantastic time” and that he only regretted “having to sleep, since that meant less time exploring the city and meeting locals.” During this part of the program, much of his time consisted of touring the city with the other students and attending classes that focused on understanding the educational system in Britain. His journals were less reflective, simply providing a list of everything he had been up to. He was clearly excited to be there and was loving everything about it, describing most experiences as “fun,” “cool,” and “nice.” He also indicated that his only problem was “not wanting to miss anything this city has to offer.” While he was eager to learn about and experience a new culture, he was exhibiting signs of the DMIS category polarization, specifically reversal, as he loved everything about this new culture but was recognizing superficial aspects of the culture rather than more meaningful differences.

Ben’s first trip outside of the UK was to Amsterdam. A couple of weeks into the semester, the four mathematics students traveled there together for a weekend. During this trip, Ben appeared to experience a cognitive dissonance (Festinger, 1957) as there was a mismatch between his prior beliefs and experiences and the behaviors and beliefs he witnessed in Amsterdam. He was immediately struck by how different Amsterdam was, saying, “Amsterdam was one of the more unique places I have ever been.” This cognitive dissonance resulted in many observations of this new culture. In a journal entry, he reflected on surface-level differences (i.e., a city filled with people riding bicycles, buildings that have existed for centuries, no skyscrapers, more people smoking cigarettes), while also for the first time in his reflections noticing somewhat deeper levels of cultural differences. He had not noticed any gas stations, speculating that it was a culture that cared about the environment. He also made a comment about being uncertain of some of the cultural norms, saying that although it is legal to smoke marijuana, he did not know if it was acceptable to do so in public.

Ben’s written observations align with his statements in some of the conversations about culture that we had as a group. During the previous summer class, we discussed the concepts of objective and subjective culture, with objective culture reflecting the observable aspects of culture (i.e. rituals, traditions, observable behavior, aspects of language and non-verbal

communication, arts and artefacts), and subjective culture reflecting the meaning behind the surface-level cultural differences (i.e. values, attitudes, beliefs, behavioral norms, social rules, and the meaning behind language and communication). Ben's reflections from Amsterdam indicate that although he was noticing mostly the objective aspects of culture, he was also beginning to see subjective elements. He considered that belief systems regarding the environment likely influenced the way of life in Amsterdam. And even though he was unsure of all the cultural norms, he was aware that there were social rules and behavioral norms that were different from other places he had been.

Before the trip to Amsterdam, Ben was in tourist mode. He spent his time touring the UK with other American students, remaining in an insular bubble, and taking new experiences at surface level, describing most things as "cool," "fun," and "nice." His observations and reflections were more about being excited and loving everything he was doing, rather than noticing or thinking critically about cultural differences. It was when he traveled to Amsterdam that he was first challenged and forced to take a step back and reflect on his experiences. The cognitive dissonance he experienced in Amsterdam was a turning point for Ben, and from here on out, his writings were more reflective. Further, he began to indicate glimpses of the DMIS category "acceptance," in that he began to notice, compare, and appreciate cultural similarities and differences.

4.3. Researcher's Visit to the UK

About a month after the students arrived in the UK, the first author visited the students for seven days. During this time, she conducted individual interviews with each student, shadowed their school internships, joined their classes at the university, participated in some of their daytime social events (e.g. joining them at a local fair), and led an in-person seminar class in which students reflected on some of their experiences abroad. During the seminar, Ben shared that he was still struggling to recognize aspects of culture and "see the bigger picture" because as he had previously noted, he "values individual experiences." He made statements like, "Individual experiences matter," implying that he valued learning about people's individual perspectives because, "how people grow up impacts the way they think." He admitted that he was struggling to get past "the individual" and see "the group" and discussed that it was difficult to distinguish between a personal value and a cultural value. However, at the same time, he was expressing a desire to understand cultural

difference. He talked about how it is easier to observe objective aspects of culture and that we can easily miss the more subtle aspects of culture. He felt unsure of how to notice these less observable aspects of culture, concluding, “The individual is the key to seeing the big picture...the better you understand yourself, where you come from, the better you will understand the culture around you.” As such, Ben was demonstrating elements of the DMIS category of acceptance—he wanted to recognize cultural differences—but he was struggling to always see and understand these differences. In this sense, Ben was showing some back-and-forth movement between minimization and acceptance, demonstrating that growth along the DMIS continuum can be nuanced and not linear.

When we met with Ben for his second interview, he appeared to begin to move past the “individual” and view others through a cultural lens, saying:

But I’m also interested in how people share the same in terms of a culture, like in the US and in the U.K. And then the U.K. and the US share some of the same values because of how connected we are. And then you go to the Netherlands and there's completely different things and then it's awesome that we have a Chinese exchange student because she has different values as well.

He was starting to see the concept of culture and the differences that exist across cultures. One of the examples he discussed involved a Chinese exchange student, Sara (pseudonym), with whom he was sharing a flat. He relayed a vignette describing an issue that the American students were having with Sara: The American students had decided they would each have their own individual shelf in the refrigerator, but Sara kept putting her belongings on the incorrect shelf. Ben explained, “They keep complaining that something ended up on their shelf that isn’t theirs, and I keep thinking, ‘It’s probably because Sara doesn’t understand it.’ It’s probably a cultural thing...” In this instance, Ben was reflecting upon a subjective cultural difference around the notion of shared space. Instead of getting frustrated by Sara’s behavior, he attempted to understand the meaning behind her behavior. He postulated that she was not putting her food on other designated shelves to be rude; rather, perhaps she had different belief systems and lived by social norms that made this peculiar for her. In considering the arc of Ben’s journey, he seemed to demonstrate aspects of acceptance within this context.

During the interview, Ben also shared that he was starting to identify aspects of British culture, observing that the brass band club he had joined was more laid back than what he was used to, not requiring tryouts and letting anyone participate. He perceived that the schedule in his school internship was more relaxed as well, sharing a story of speaking with a teacher who was late to class but kept talking to him—something he did not think would happen back home. He recognized that his university classes were more easy-going with longer “tea breaks,” and less need to begin on time. He was aware of different beliefs on alcohol, noticing that there was a bar in the university’s student union, something that did not exist back home. He shared that the British humor was more “aggressive,” saying, “Aggressive being not a bad thing, aggressive as in it’s more roasting each other,” and that he had recently roasted someone in a way that he “would not even think about doing back home,” teasing them for a shirt they were wearing, but saying that the group he was with “loved it.” He was beginning to see culture in ways he had not before and was once again demonstrating growth in his cultural perspectives.

4.4. Ben’s Updated Views

Toward the end of the semester, Ben also reflected on how his views on the subject of mathematics and successful teaching of the subject had changed. He shared that, overall, he was starting to look for math in more places—that he was “seeing math in music, ballistics, and taxes.” He said that his time in his school internship (which involved work in a secondary mathematics class dedicated to the teaching of real-world quantitative and problem-solving skills) and his travels around Europe had helped him see these real-world applications of the subject. He gave the example of visiting the Galileo Museum, considering “how the slow introduction of mathematics reverberated throughout the world, changing the way everyone thought about and perceived the universe.” He wrote about how he was appreciating the Japanese ideas of heavy representations, careful lesson study, and precise use of language (Rasmussen & Isoda, 2019), topics the students had been discussing in their university classes. He wanted to incorporate these ideas into his teaching back home.

When he described successful mathematics teaching, he still discussed the fact that a teacher should push high-level thinking, but he also, for seemingly the first time, began to demonstrate thinking associated with the DMIS category of acceptance within his views of mathematics teaching. Specifically, he reflected on how his students’ backgrounds and experiences would impact his

teaching. Saying, “I think that my understanding of cultural diversity is fundamental to the way I approach teaching,” he wrote, “People have vastly different experiences than I do, and they also have different values.” He realized that part of the disconnect between him and his students during his student teaching experience was that he was not recognizing their values and experiences. He had valued a conceptual understanding of mathematics and believed if you are only doing procedures then you are not really doing mathematics, but his students did not see it that way. As Ben put it:

I can say my time in Europe has changed what I enjoy about math. I still believe in what I said previously, that the best piece for me is problem solving and the conceptual. I also think that’s the most important piece of math. But I think that I’ve missed something crucial about math. Reflecting on different cultures and understanding of the world has helped me understand some of the disconnect between my students and I back when I was student teaching. The truth is, they valued getting a correct answer. They didn’t care how. It was the beauty and relief of finishing a problem with a tool they had that pushed them forward. It wasn’t their skill, but their ability to use a tool that connected them to the mathematics. Up until studying here and thinking deeply about cultural differences I failed to see some people fundamentally don’t feel the way I do.

He went on to say that people do not make the decision to see the subject in the way that they do; rather, “It’s their circumstances that lead them to act different ways in different situations.” In his student teaching placement, his lessons targeted conceptual understanding, while his students valued procedural fluency. He was realizing now that this was part of why there was a clash between him and his students during student teaching. He had not recognized or valued what his students appreciated—or did not appreciate—about the subject:

Looking at what my students’ value, how my students view math, how my students view education, and applying it to my own understanding to grow and change my teaching style overtime is going to be fundamental to my practice.... I will be careful to not push my own view of the mathematics on the students; rather, I will shape my strategies and methods to what they enjoy, value, and believe. Over time, after gaining my students trust, I will offer different options to pieces already in place.... Careful reflection on my students and their situations [and what they value] will lead me to become a better, more effective, efficient

teacher that can reach out to students in many different ways rather than simply through the mathematics.

While the examples he gave of understanding his students were focused mostly on their views of and prior experiences with mathematics (rather than their cultural backgrounds), the fact that he was now acknowledging and emphasizing his students' previous experiences demonstrated a shift in perspective, as in previous reflections at the beginning of the semester, he had not even mentioned his students and their impact on his classroom. This excerpt from Ben's journal summarized his beliefs about mathematics teaching and how they have shifted through participating in this program:

The biggest change for me here is around understanding of the students. A successful teacher doesn't just have solid personal beliefs to lead the classroom forward—the teacher must also have a clear understanding of the goals of their individual students. Establishing a strong and clear connection with their students, one of leadership yet comfortable and understanding is pivotal to a successful teacher. Simply pushing an agenda is not enough.... Understanding where a student is coming from in the long run is just as important to getting them to commit to the material as having firm beliefs. Adapting lessons and mindsets around cultural differences between student and teacher to help both grow together overtime, that is what an ideal teacher should hope to achieve.

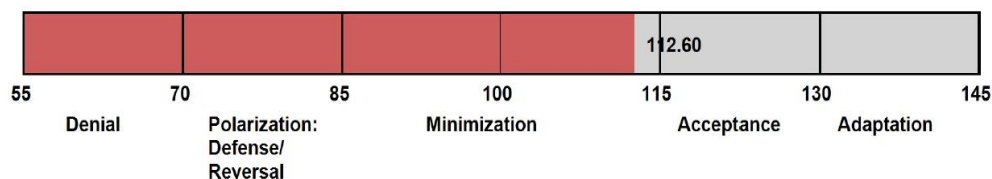
While at this juncture Ben did not provide ideas on what it might look like to adapt lessons and mindsets around cultural differences, these were concepts that he was now aware of and thinking about which was not the case before participating in this program.

4.5. Returning to the United States

At the start of the spring semester after their return home, the students took the IDI again. Ben's developmental orientation showed growth, with him falling on the higher end of minimization at 112.62 (see Figure 3 on the next page). We believe this made sense for Ben at this time, as he had been demonstrating representations of minimization and acceptance throughout his time overseas.

FIGURE (3)

BEN'S INTERCULTURAL DEVELOPMENTAL ORIENTATION (AT CONCLUSION OF THE PROGRAM)



However, upon reviewing Ben's journal entries and interviews, one question kept sticking out. Ben had said several times that he now understood culture and that his understanding of cultural diversity would be fundamental to the way he approached teaching, but he had not described how. We kept wondering: was Ben's understanding of culture superficial, or was there a true change of awareness that could transform his practice? We discussed this with Ben. We asked him to explain some of the statements he had made previously, starting with this statement: "Adapting lessons and mindsets around cultural differences between student and teacher to help both grow together overtime, that is what an ideal teacher should hope to achieve."

He elaborated on this statement by giving an example from his current spring teaching internship back in the US. He described how one of his teachers wanted students to get comfortable talking from the front of the classroom, so to incentivize that mindset, the teacher said that the highest grade they could earn was an 80% if they presented from their seat. In this situation, Ben noticed that only the White female students chose to present from the front of the room, and the rest of the students chose to present from their seats. Ben described:

And it really did get me thinking, and I was trying to think of ways around that other than using grades because clearly while to me and the teacher and a couple of the students, that was a good incentive, it wasn't for others. So, I guess what I'm kind of getting at is that just because something lines up with my upbringing and my cultural values, doesn't mean that it will motivate or speak to the students. So that's definitely not an individual thing. It's not like 18 of the 22 students all individually said, "No, I really don't want to go up to the front of the classroom even if it's for 20 points." It was a cultural mindset that either it's such a scary thing that even 20 points isn't worth it, or the 20 points don't matter so I will just present from my desk instead.

Ben recognized that what had motivated him as a student might not motivate his own students. He said that when he begins teaching, he will want

to take “it slow and not make assumptions based off of [his] prior experiences.” Furthermore, he explained,

Instead of framing my teaching in a way that’s like, it’s my way or the highway, or going to individual students looking for suggestions, I will try to identify big aspects of the subculture of the school, or even just the culture in general. I can only know so much right now [about culture] because of my limited experience, but I will really try to learn what works and what doesn’t work by playing around with ideas, rather than making bigger assumptions like “This is the way it has to be” or only trying the strategies that worked on me as a kid. So, I will try to be as observant as possible rather than just trying to force my ideas down their throat.

This narrative illustrates three key elements of growth. First, Ben recognized what had motivated him as a student might not motivate his own students, and he made a point to say that in his own teaching he will take “it slow and not make assumptions” about his students based only on his experiences and values. Second, he recognized that there was something more complex happening regarding the motivations of 18 out of the 22 students individually deciding not to speak in the front of the room, something he may not have considered before. Instead, he realized that the teacher had fostered a culture in the classroom that made speaking from the front of the room a non-preferred task. Ben was realizing that even individual classrooms have a culture, and that the teacher plays a huge role in the dynamics within the classroom. Lastly, he noticed that only the White females fully participated in the activity—something he may not have noticed or pointed out previously but was an important observation—and he decided to discuss it with his multicultural education professor from another class that he was taking. Through discussing it with his professor, he realized that there could be other, more positive, ways of encouraging all students to participate in an activity. All of this shows that Ben was noticing his students’ races, cultures, and genders more expansively while reflecting on teaching in ways that he had not previously.

In the end, Ben made sure to emphasize that he was aware that he did not know everything about cultural difference: “It’s almost that I’m knowing everything that I don’t know at the moment, so I’ll keep learning more about culture when I start teaching,” but that the first step in learning more was to be aware that he still had more to learn.

5. Discussion

Ben's experiences throughout this program demonstrate the evolution that may occur in one's cultural perspectives and teaching philosophies through participation in an education abroad program. At the outset of this program, Ben had little understanding of his own cultural identity, and he shunned noticing cultural difference. If teachers "must be sensitive to their students' cultural backgrounds" (Mahon, 2003, p. 5) to ensure an equitable education for all, then Ben began far away from this goal. Because Ben fell within a dominant cultural group in the United States, his culture was never challenged: he could exist thinking that he did not have a culture, and that culture was a construct that pertained only to other people—people not in the dominant culture (Ahmed, 2007; McIntyre, 2002). But, once Ben took the IDI at the outset of the program, he became motivated to begin noticing culture, and throughout his time abroad, he started to look for and acknowledge cultural differences. As evidenced by his post-IDI score and the narrative presented in the previous section, ultimately Ben's notion of culture shifted, suggesting that participation in an education abroad program, coupled with purposeful and guided reflection, can be catalytic in influencing preservice teachers' perspectives in this area.

Additionally, Ben's philosophies of mathematics teaching shifted throughout the program, which was a primary goal of this particular program. While this program was broadly designed to follow the widely accepted model of education abroad programs for preservice teachers (i.e., this program spanned an entire calendar year with an entire semester dedicated to the pre-departure and re-entry phases, and during their full semester overseas, students interned in local schools, completed education-specific coursework, and immersed themselves in new cultural experiences through travel and day-to-day living contexts), Ben's program was distinctive in that it focused on mathematics education. All students in this program were preservice mathematics teachers, and while abroad, their internships and courses were all focused on mathematics education. By design, this provided space for them to consider how their cultural learning from this program might influence their mathematics teaching. For Ben, this shift was noteworthy.

When Ben first started this program, many of his beliefs on mathematics teaching already appeared to align with highly-regarded approaches. He valued opportunities to explore, create, and approach problems from different angles, and he wanted to pass this along to his students. However, Ben was missing a

key aspect of teaching mathematics: Not only was Ben not discussing the importance of being responsive to his students' backgrounds; he barely mentioned his students. He would discuss that he wanted his students to see the value of the subject, and that he wanted to inspire them to "enjoy, understand, and learn mathematics in any way possible," but he never articulated the importance of understanding his students, their prior experiences, backgrounds, values, or traditions. What was their prior knowledge? What were their previous experiences? What did they value? What were their backgrounds and traditions? These were not areas that Ben discussed or reflected on prior to participation in this program. At the outset of this study, he also indicated that he believed his cultural identity and his students' cultural identities would not impact the way they experienced school.

However, by the conclusion of the program, nearly a calendar year later, he was recognizing that culture influences the experiences, values, beliefs, and perspectives that people have, and he was aware that his students' cultures, specifically their experiences and values, could be different from his own. He indicated that he now believed his, and his students', cultural identities would influence their classroom experiences, and he discussed a desire to incorporate his students' perspectives and values into his teaching. He acknowledged that part of the disconnect between him and his students during his student-teaching experience in the year prior to this program occurred because he had not recognized their values and experiences. He realized that he had been viewing mathematics education through a different lens than his students by valuing an aspect of the subject that they did not value; thus, he was implementing lessons that they struggled to connect to. At the end of the program, Ben was also noticing race and gender in ways that he had not demonstrated previously. He shared a story about his internship teacher trying to incentivize students to present their work from the front of the room by making it part of their grade. Instead of brushing it off as an unsuccessful lesson in which individual students lacked interest, Ben wondered if there was more to it—perhaps a cultural difference that was contributing to the lack of student participation and enthusiasm, ultimately resulting in the majority of students of color receiving lower grades. Upon further thought, he realized that there could be other, more positive, ways of encouraging all students to participate in the activity.

In this sense, prior to studying abroad, he was poised to begin his career embodying many of the highly-regarded approaches to teaching the subject. For

example, he articulated a desire to include inquiry approaches, conceptual understanding and multiple representations, mathematical teaching practices that are valued in the field (Friesen & Kuntze, 2020; Prusak et al., 2013). However, without his shifting perspectives on culture, he was not yet ready to consider many of the field's most recent recommendations as noted in the introductory section of this paper. Ben's story across the arc of this program demonstrates that preservice mathematics teachers can enhance their orientation to cultural difference through participating in an education abroad program designed to foster that outcome. It also shows that content-specific education abroad programs offer potential for teachers to reimagine and challenge many of the ingrained foci and values of their disciplines. That is, Ben concluded this program with emerging tools to see culture and consider his future professional practice in different ways. While we cannot offer a singular model for education abroad programs across content areas, we have offered evidence for program developers to consider as they frame their own goals and elements within their own program design.

5.1. Next Steps for Ben

In order to best support Ben in his journey as an emerging professional educator following his participation in this study abroad program that occurred in his penultimate semester as a teacher in training, leveraging the frameworks that help mathematics teachers draw on students' cultural backgrounds within a lesson or task (Gallivan, 2020; Makonye, 2020) could be beneficial. These frameworks provide preservice and in-service teachers with strategies for creating mathematics tasks that draw on students' cultural backgrounds and funds of knowledge. In following iterations of the program, this would be an appropriate focus within the re-entry course that students complete during their spring and final semester, as it would have encouraged Ben to deepen his cultural learning by considering ways of applying his new perspectives in the context with students in an actual mathematics classroom. Further, for future students in this program, this kind of work would help them make connections between their learning abroad and their work with diverse students back home, which we know is an enduring challenge within education abroad programming (Nyunt et al., 2022). Students do not always make this connection, and this work within a re-entry course could guide them to do so. In this case, the mathematics education theme of this study abroad program serves as a

specific context in which to foster a bridge between the continuum of experiences both home and abroad.

Additionally, in subsequent iterations of this program, we would consider applying Helms' (1984) Model of White Identity Development, which provides a framework for establishing an anti-racist White identity. While Ben's development in the program seemed to align with the first two stages of this model, we believe that incorporating this framework explicitly into our work with students would further their development in this area and help them make connections between their learning abroad and their work with diverse students back home.

6. Implications

Finally, there were key aspects of this program that we believe fostered Ben's cultural learning: (1) explicit and purposeful discussions and reflections related to culture, and (2) the use of the IDI as a catalytic tool to guide such reflections. Following, we briefly describe these components as they were an important part of this program.

6.1. Explicit Discussions and Reflections Related to Culture

Research informs us that in order to facilitate intercultural growth within an education abroad experience, programs must make it a priority for students to reflect on what they are encountering (Cushner, 2018). As such, explicit discussions and reflections relating to culture were an important part of this program. As Cushner (2018) described, "Culture operates on two levels—a visible objective level and an invisible subjective level" (para. 7). Objective culture refers to "the tangible elements of a culture—the artifacts people make, the clothing worn, the food eaten, and sometimes the names given to things" (para. 7). However, "the more profound and meaningful levels of culture operate at the subjective level" (para. 8). These include attitudes, beliefs, values, behavioral norms, social rules, and the meaning behind language and communication. At the beginning of the program, we defined and discussed these two levels in which culture can operate so that students could begin to understand the different ways culture manifests itself. Then, throughout the program, we continually returned to these ideas, reflecting on the objective and subjective aspects of culture they were noticing and experiencing overseas. Without explicit and purposeful discussions around cultural differences (often

but not limited to the context of mathematics education), students could have easily missed the subjective aspects of culture, and as Cushner (2018) notes, “Understanding this is fundamental to the success of any intercultural interaction” (para. 9).

6.2. The IDI

Relating to explicit discussions around culture, as mentioned previously, the IDI was also a powerful catalyst in helping students explore their cultural identities. During the summer course prior to departure, we discussed each category within the DMIS (Denial, Polarization (Defense or Reversal), Minimization, Acceptance, and Adaptation). These definitions helped students think about the different ways in which people can respond to cultural difference. After these discussions, which were often among the first substantial and theoretically grounded discussions related to culture that these students had ever had, they received their IDI report and learned which category they were assigned on this initial administration. By analyzing the categories represented in the DMIS and IDI report, students were provided with a common vocabulary to begin understanding and discussing the ways in which they respond to cultural difference. This suggests that leveraging the IDI’s reports in the pre-departure work is one important step to becoming more culturally aware because it affords students the language and concepts to begin delving into culture in a formal and guided way. Also, upon realizing the category they fall into, students typically become motivated to grow into more culturally sensitive people. In this sense, the IDI’s impacts are twofold: it helps students understand notions underpinning cultural difference, and it also may encourage them to become more culturally aware.

We believe that these components of the program along with traveling abroad and experiencing 24/7 immersion in a new culture are what ultimately impacted Ben’s learning and growth into a more culturally aware mathematics teacher. He was forced to navigate all aspects of his life within a new culture and did not have the ability to ignore cultural difference anymore, as he demonstrated prior to this program. With that said, not all students have the ability to study abroad. The cost, their design program/major requirements, and immigration/visa issues are just some of the challenges that prevent students from participating in these experiences. Therefore, we recommend that teacher education programs in the US consider similar ways of leveraging the IDI and explicit discussions about culture (integral aspects of this program) to their

professional work within their US-based programming in an effort to afford similar learning opportunities to a greater number of students. With such a small number of education majors studying abroad as part of their formal schooling, there is great potential to expand these numbers while concurrently exploring ways to implement best practices on the home front.

7. Closing

In summary, to truly support issues of access and equity within mathematics education, we must take seriously the calls for change within the field. TODOS (2020) remains committed to challenging beliefs that perpetuate microaggressions. AMTE (2020) has emphasized the importance of implementing “practices that draw on students’ mathematical, cultural, and linguistic resources/strengths” (p. 2). All of this underscores that mathematics teachers must not disregard their students’ cultures, perspectives, values, and experiences. A mindset of downplaying students’ personal, cultural, and linguistic identities in order to participate in the mathematics classroom (Gutiérrez, 2007) limits our ability to create an equitable mathematics education for all students. Therefore, to address issues of racial, cultural, and socioeconomic inequity, we need to help our future teachers *see* race, culture, and socioeconomic status. The narrative uncovered and reported in this research demonstrates that strategically facilitated education abroad experiences can help future mathematics teachers see themselves as cultural, recognize their students’ cultures, and ultimately, work across cultures in their future teaching. Perhaps this type of culturally-rich programming is what has been systemically missing in the preparation of mathematics teachers, and we should endeavor to create more experiences for this type of experiential and immersive learning. Further, as mentioned above, educators in other content areas might consider applying key aspects of this program to the preparation of their respective preservice teachers, as the work reported here can be considered across all disciplines.

References

- Ahmed, S. (2007). A phenomenology of whiteness. *Feminist Theory*, 8(2), 149-168.
- Association of Mathematics Teacher Educators. (2020). *AMTE statement on systemic racism*. <https://amte.net/files/AMTE%20Racism%20Press%20Release.pdf>
- Bennett, M. J. (1986). Towards ethnorelativism: A developmental model of intercultural sensitivity. In R. M. Paige (Ed.), *Cross-cultural orientation: New conceptualizations and applications* (pp. 27–70). University Press of America.

- Bennett, M. J. (2004). Becoming interculturally competent. In J. Wurzel (Ed.), *Towards multiculturalism* (2nd ed., pp. 62-77). Intercultural Resource.
- Byram, M., & Feng, A. (Eds.) (2006). *Living and studying abroad: Research and practice*. Multilingual Matters.
- Cushner, K. (2009). The role of study abroad in preparing globally responsible teachers. In Lewin, R. (Ed.), *The handbook of practice and research in study abroad: Higher education and the quest for global citizenship* (pp. 151-169). Routledge.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford University Press.
- Friesen, M. E., & Kuntze, S. (2020). The role of professional knowledge for teachers' analysing of classroom situations regarding the use of multiple representations. *Research in Mathematics Education*, 22(2), 117-134.
- Gallivan, H. R. (2020). Revising tasks to be culturally relevant. *Mathematics Teacher: Learning and Teaching PK-12*, 113(10), e43-e50.
- George Mwangi, C. A., & Yao, C. W. (2021). U.S. higher education internationalization through an equity-driven lens: An analysis of concepts, history, and research. In L. W. Perna (Ed.), *Higher education: Handbook of theory and research* (Vol. 36, pp. 549-609). Springer.
- Gertz, C. (1973). *The interpretation of cultures*. Basic Books New York.
- Grbich, C. (2013). *Qualitative data analysis: An introduction*. Sage.
- Gutiérrez, R. (2007). Context matters. In T. Lamberg & L.R. Wiest (Eds.). *PME-NA conference proceedings* (pp. 1-18).
- Hammer, M. R., & Bennett, M. J. (1998). *IDI*. Intercultural Communication Institute.
- Hammer, M. R., Bennett, M. J., & Wiseman, R. (2003). Measuring intercultural sensitivity: The intercultural development inventory. *International Journal of Intercultural Relations*, 27(4), 421-443.
- Hammer, M.R. (2012). The intercultural development inventory: A new frontier in assessment and development of intercultural competence. In M. Vande Berg, R.M. Paige, & K.H. Lou (Eds.), *Student learning abroad* (pp. 115-136). Stylus Publishing.
- Heinzmann, S., Künzle, R., Schallhart, N., & Müller, M. (2015). The effect of study abroad on intercultural competence: Results from a longitudinal quasi-experimental study. *Frontiers: The Interdisciplinary Journal of Study Abroad*, 26(1), 187-208. <https://doi.org/10.36366/frontiers.v26i1.366>
- Helms, J. E. (1984). Toward a theoretical explanation of the effects of race on counseling: A Black and White model. *The Counseling Psychologist*, 12(3-4), 153-165. <https://doi.org/10.1177/0011000084124013>
- Helms, J. E. (2004). Racial identity development and its impact in the classroom. In G.W. Hill & L.M. Noble (Eds.), *Reaching through teaching* (pp. 6-8). Kennesaw State University Digital Commons.
- Iannone, P., & Cockburn, A. D. (2008). "If you can count to ten you can count to infinity really": Fostering conceptual mathematical thinking in the first year of primary school. *Research in Mathematics Education*, 10(1), 37-51.
- Mahon, J. A. (2003). *Intercultural sensitivity development among practicing teachers: Life history perspectives* [Unpublished doctoral dissertation, Kent State University].
- Makonye, J. P. (2020). Towards a culturally embedded Financial Mathematics PCK framework. *Research in Mathematics Education*, 22(2), 98-116.
- Marx, H., & Moss, D. M. (2011). Please mind the culture gap: Intercultural development during a teacher education study abroad program. *Journal of Teacher Education*, 62(1), 35-47.
- McIntyre, A. (2002). Exploring whiteness and multicultural education with prospective teachers. *Curriculum Inquiry*, 32(1), 31-49.

- Medina, A., Hathaway, J., & Pilonieta, P. (2015). How preservice teachers' study abroad experiences lead to changes in their perceptions of English language learners. *Frontiers: The Interdisciplinary Journal of Study Abroad*, 25(1), 73–91. <https://doi.org/10.36366/frontiers.v25i1.346>
- Merryfield, M. M. (2000). Why aren't teachers being prepared to teach for diversity, equity, and global interconnectedness? A study of lived experiences in the making of multicultural and global educators. *Teaching and Teacher Education*, 16(4), 429-443.
- Mills, A. J., Durepos, G., & Wiebe, E. (2010). *Encyclopedia of case study research*. SAGE Publications.
- Moss, D. M., Simmons, J., Izard, B., & Marx, H. (2020). Going global in teacher education: Lessons learned from scaling up. In L. Baecher (Ed.), *Study abroad in teacher education: Transformative learning at the global scale*. Routledge.
- National Center for Education Statistics. (2023). Characteristics of Public School Teachers. *Annual Reports and Information Staff (Annual Reports)*. U.S. Department of Education. <https://nces.ed.gov/programs/coe/indicator/clr>
- National Council of Teachers of Mathematics. (2014). *Access and equity in mathematics education*. <https://www.nctm.org/Standards-and-Positions/Position-Statements/Access-and-Equity-in-Mathematics-Education/>
- Nyunt, G., Niehaus, E., & Benavides, M. (2022). A catalyst for learning or reinforcement of inequities: Using a critical hope lens to understand the potential and limitations of short-term study abroad in fostering students' ability to effectively interact across differences. *Journal of Diversity in Higher Education*, 17(3), 346-357.
- Phillion, J., Malewski, E. L., Sharma, S., & Wang, Y. (2009). Reimagining the curriculum in study abroad: Globalizing multiculturalism to prepare future teachers. *Frontiers: The Interdisciplinary Journal of Study Abroad*, 18(1), 323–339. <https://doi.org/10.36366/frontiers.v18i1.269>
- Pratt, N., & Woods, P. (2007). Changing PGCE students mathematical understanding through a community of inquiry into problem solving. *Research in Mathematics Education*, 9(1), 79-94.
- Prusak, N., Hershkowitz, R., & Schwarz, B. B. (2013). Conceptual learning in a principled design problem solving environment. *Research in Mathematics Education*, 15(3), 266-285.
- Psychology of Mathematics Education of North America (PME-NA). (2020). *Equity statement*. https://pmena.org/documents/PMENA_Equity_Statement_2020_June.pdf
- Rasmussen, K., & Isoda, M. (2019). The intangible task—a revelatory case of teaching mathematical thinking in Japanese elementary schools. *Research in Mathematics Education*, 21(1), 43-59.
- Saldaña, J. (2016). *The coding manual for qualitative researchers*. Sage.
- Shiveley, J., & Misco, T. (2015). Long-term impacts of short-term study abroad: Teacher perceptions of preservice study abroad experiences. *Frontiers: The Interdisciplinary Journal of Study Abroad*, 26(1), 107–120. <https://doi.org/10.36366/frontiers.v26i1.361>
- TODOS: Mathematics For All. (2020). *The mo(ve)ment to prioritize antiracist mathematics: Planning for this and every school year*. <https://www.todos-math.org/assets/The%20Movement%20to%20Prioritize%20Antiracist%20Mathematics%20Ed%20by%20TODOS%20June%202020.edited.pdf>
- Yin, R.K. (1984). *Case study research: Design and methods*. SAGE.
- Zemach-Bersin, T. (2007). Global citizenship and study abroad: It's all about U.S. critical literacy. *Theories and Practices*, 1(2), 16–28.

Author Biography

Blair Izard, Ph.D., is an Assistant Professor of Mathematics Education at State University of New York (SUNY) Empire State University. Her doctorate is in Mathematics Education and Global Education, and her research interests include the influence of education abroad on the preparation of preservice mathematics teachers, the design and implementation of education abroad programming, and the incorporation of social justice tasks in the K-12 mathematics curriculum.

David M. Moss, Ph.D., is an Associate Professor on the faculty of the Neag School of Education at the University of Connecticut. Specializing in curriculum studies and internationalizing US teacher education, his research interests are in education abroad program design & assessment. He has published numerous articles and reform-minded books and served as a keynote and featured speaker at scholarly societies, universities, and national/international conferences. He directs the Neag School London Study Abroad program.