



Journal of International Students
Volume 15, Issue 6 (2025), pp. 185-202
ISSN: 2162-3104 (Print), 2166-3750 (Online)
jistudents.org
<https://doi.org/10.32674/gqfxc366>

Digital Narratives for a Changing World: An International Virtual Learning Exchange on Climate Change

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ABSTRACT

As the climate crisis continues to accelerate, multiple sectors of society are working collaboratively to research, develop, and implement strategies and policies that target the sources of the problem to slow or reverse the impacts of climate change. As centers of innovation, institutions of higher education have sought to develop new curricula that enhance students' abilities to address climate change locally and globally. Universities have developed virtual learning exchange curricula that connect students from multiple countries and prepare them to work collaboratively to develop solutions for local and global challenges such as climate change. This paper presents findings from a virtual exchange program in which undergraduate university students living in the Greater Chicago region in the United States and the city of Calabar in Nigeria researched and reported on experiences of climate change impacts within their local environments and appropriate ideas for mitigation and adaptation.

Keywords: International Virtual Exchange, Climate Change and Virtual Exchange, Virtual Exchange and Storytelling, Climate Change in Nigeria, Climate Change in Chicago

Introduction

In many countries, the severe environmental impacts of climate change have exacerbated well-known challenges to human development, such as poverty, food insecurity, malnutrition, natural disasters, communicable and noncommunicable diseases, and mortality (Udoh & Willard, 2023; United Nations Climate Action, 2022; IPCC, 2023; Udoh, 2013). In Nigeria, most of the country's land cover is under severe stress from drought and desertification due to climate change (Shiru et al., 2020). Drought and

desertification threaten rain-fed agriculture and thus food security, employment, and livelihoods for nearly 200 million people. Agriculture provides employment for approximately 70% of Nigerians and contributes 41% of the GDP, 5% of the country's exports, and 88% of nonoil earnings (Akram et al., 2025; Udemezue & Kanu, 2019; Falaki et al., 2013).

In Nigeria's Niger Delta region, oil production and agriculture pose severe threats to the environment. Oil companies flare more natural gas during oil production than any other top oil-producing country except Russia, accounting for 10% of the total natural gas flared globally and producing more greenhouse gas emissions in Africa than all other sources combined (Udoh, 2020; USEIA, 2019; Udoh, 2013). The adverse environmental impacts associated with oil exploration (i.e., release of carbon dioxide and other associated gases, erosion, flooding, deforestation, loss of soil fertility, depletion of biodiversity, soot pollution, acid rain formation, human displacement, and forced migration) are critical sources of poverty and exposure to communicable diseases, such as HIV/AIDS, malaria, meningitis, and cholera (Oluwatimilehin et al., 2022). These impacts also contribute, directly or indirectly, to increases in cancers, heart diseases, skin diseases, cardiovascular infections, and malnutrition (Udoh, 2020; 2013; UNEP, 2011).

Environmental education is especially important in Nigeria's Niger Delta region, which covers a land area of approximately 70,000 km² and consists of mangrove, swamp, and lowland rainforests. Previously described as a "pristine ecosystem" with rich biodiversity (Jack & Zibima, 2018; Biereenu-Nnabugwu et al., 2015), this natural ecosystem has been severely threatened and damaged by oil production and agriculture in recent decades. Frequent record-setting oil spills, constant flaring of excess associated gases, and clearing of forest reserves by oil companies, artisanal oil refiners, illegal loggers, and land developers have degraded the region's environment and accelerated climate change. To address these challenges effectively, it is crucial to implement place-based and locally conceptualized solutions that focus on the experiences of communities directly affected by climate change.

Chicago is also experiencing climate-related challenges. Climate science research predicts increasingly variable precipitation in Chicago, suggesting that the region may experience increased temperatures and precipitation in winter and spring, as well as an increase in the length of the growing season. This may lead to 'shifts and expansion in the range of insects, diseases, and weeds' (Bendorf et al., 2025). Additionally, rainstorms are predicted to be more intense, which will directly impact the Chicago River water system. This will lead to increased erosion and fluctuations in river levels and could diminish native species populations. Extreme runoff will result in more polluted water, and reduced summer water levels will lead to decreased aquatic habitat (Pryor et al., 2014). In addition, increased flooding will exacerbate instances of combined sewage overflow (CSO) by releasing untreated sewage into the Chicago River System (Pryor et al., 2014). The intensification of heat waves will increase mortality rates in the region, and rising temperatures will lengthen the season and range of disease-causing insects and increase the risk of human exposure to vector-borne diseases (Pryor et al., 2014). These climate change impacts are compounded by the processing and marketing of petroleum coke and coal for energy, which have been identified as sources of greenhouse gas emissions and risk factors for noncommunicable diseases such as asthma and cancer (Perera, 2017; Hawthorne, 2023). This research addressed the following questions:

1. How do international virtual exchange programs influence international students' sense of agency and empowerment in contributing their local environmental knowledge and perspectives to global climate change discussions?
2. How do international students navigate and reconcile potential differences between their cultural approaches to environmental problem solving and those presented by peers from other countries during virtual exchange?
3. In what ways does participation in international virtual exchange programs affect international students' willingness to challenge or complement dominant Western perspectives on climate change solutions with their own cultural and regional insights?
4. What impact does virtual exchange between Global North and Global South students have on international students' understanding of climate justice and their ability to recognize disparate regional vulnerabilities to climate change?

THEORETICAL FRAMEWORK

We aimed to implement a place-based virtual education exchange curriculum that uses service learning and problem-based, story-telling methods (Smith, 2016; Erpestad, 2013; Heo, 2004a; 2004b; Davidhizar, 2003) to increase the capacity of international undergraduate students to explore their natural and human-made environments, collect and synthesize local experiences of climate change sources and impacts, analyze the data for cross-national similarities and differences, and work collaboratively to design culturally appropriate solution strategies via technology. We also aimed to improve students' environmental attitudes by encouraging sustainable ecological practices and increasing their capacity to advocate for their environments through a mentoring partnership with climate-focused, community-based organizations. The experiential nature of the virtual exchange projects sought to increase students' curiosity and awareness of the sources and impacts of climate change in their local communities.

Given the participatory nature of virtual exchange projects, we integrated elements of critical service-learning theory, as framed by Michell (2008), Smith (2024), and Sherwood and colleagues (2024). In this process, we aimed to go beyond traditional service learning's limited focus on guiding students to provide basic community assistance. Instead, we guided them to engage in reflection, analysis, and action with the goals of identifying and addressing the root causes of climate change and deconstructing power systems in service of social and environmental justice. As agents of change, students assessed the unequal burdens of climate change impacts between the Global North and Global South and across urban and rural contexts (Coolsaet & Deldreve, 2024). They also developed indigenous and place-based knowledge and skills that can empower vulnerable groups to increase their environmental literacy and critical thinking, as well as promote pro-environmental attitudes and sustainable development within their communities (Maharjan et al., 2024). Using storytelling helped them gain a better appreciation of the climate-induced changes around them. It motivated them to build connections with their environments, other people and places and to work collaboratively to confront the climate crisis (Climate Stories Project, 2021). Overall, the virtual exchange projects sought to close the equity gap in international education experience among students that results from the lack of opportunity

to study abroad and engage in person with international peers in foreign countries owing to cost, visa, and family challenges. Universities and colleges have used virtual learning exchanges to help more students achieve international and cross-cultural competencies (Workman et al., 2025).

Institutions of higher learning have successfully used virtual learning exchange to prepare students to function as citizens, advocates, and a productive workforce in an increasingly globalized world environment (Poe, 2022; Zwerg-Villegas & Martínez-Díaz, 2016). Diverse groups of students from two or more countries have worked collaboratively to achieve common learning objectives through the use of accessible technology tools (Alvarez et al., 2025; Davison et al., 2017). This process accelerates the acquisition of essential competencies by students, including inter- and cross-cultural knowledge and communication, empathy, and critical thinking through synchronous and/or asynchronous engagement (Gutiérrez et al., 2022; Zwerg-Villegas & Martínez-Díaz, 2016). Research by Giralt et al. (2022) and Abrahamse et al. (2015) demonstrated that virtual exchange programs on climate-related topics conducted with university students from different continents, some specifically those designed with a South–North outlook, have shown promising results. Similar studies have also revealed shortcomings in college students’ understanding of sustainability (Kruger et al., 2020).

This paper addresses critical gaps in research on virtual learning exchange. These include considering the long-term impact of virtual exchange on international student agency. The paper also adds to the knowledge of the effectiveness of different digital platforms for international student engagement and ways to integrate international students’ local knowledge better. It also contributes to the understanding of strategies for supporting international students’ cultural navigation in virtual spaces.

METHODS

To accomplish the study goals and answer the guiding questions, we used a qualitative study design to observe participants, which included undergraduate students from the University of Calabar and DePaul University. The observations also included course instructors and facilitators, community partners, and community members who shared climate stories. Supported by funding from the National Geographic Society, we implemented two virtual exchange projects, known as global learning experience (GLE), between DePaul University in Chicago (Chicago) and the University of Calabar (Calabar) in Nigeria. The GLE is a transformative virtual experience in which U.S. students work collaboratively with peers from an international partner institution on projects via online collaboration tools (DePaul Teaching Commons, 2023). One of the objectives of the GLE is to build university students’ intercultural competencies and frame their discipline-specific knowledge in local and global contexts. Through this process, students become equipped with skills to successfully contribute to solving challenges facing an increasingly interconnected world (IIE, 2019). The GLE programs highlighted in this paper aimed to build a relationship between Chicago and Calabar by integrating virtual exchange modules into credit-bearing courses, using technology and personal contact.

Anchored in the critical service-learning framework (Weigert, 1998; Kendall, 1990), we implemented joint curricula to promote undergraduate student engagement in the service of social and environmental justice. Using the critical service-learning framework

enables students to reflect on and analyze the root causes of climate change in their communities, thus strengthening the sense of the collective and community and the values of family, neighborhood, and citizenship (Weigert, 1998). Critical service learning acknowledges that institutions of higher learning have a responsibility to prepare students to be civic leaders, advocates of social and environmental justice, and active partners for solving local and global challenges (Smith, 2016).

This virtual exchange was conducted in three overlapping phases. In Phase One, between September 2023 and February 2024, the project instructors and facilitators worked collaboratively via numerous Zoom- and WhatsApp-mediated meetings to plan and codevelop the curricula. During this phase, the instructors applied and received institutional review board approval from DePaul University and ethics approval from the University of Calabar. We worked with instructional developers to create the Google and WhatsApp platforms that facilitated the management of the learning content and resources. Prior to starting substantive learning activities, instructors from DePaul University traveled to the University of Calabar to meet with students, cofacilitators, and administrators and to conduct technical and procedural training. We implemented the same processes at DePaul University.

In Phase Two, between March and June 2023, multiple undergraduate courses from DePaul's environmental science and studies department were merged with courses from the Department of Geography and Environmental Studies at Calabar. In one exchange program, we paired 30 Chicago students enrolled in Energy and the Environment (ENV 204) with 45 Calabar students enrolled in Global Energy Systems (GES 424) over the course of one term. In another program, we paired 30 Chicago students enrolled in the Resources Population and the Environment (ENV 202) with 45 students from Calabar enrolled in Conservation Planning (GES 433). While Calabar students comprised primarily Nigerian traditional students and a handful of students from neighboring countries, many participants from DePaul were international undergraduate students migrating from around the world; a few others were Americans.

We merged sections of the syllabi for each pair of courses during the six weeks of virtual exchanges. The combined modules covered key topics in energy production and environmental sustainability; population and food security; climate, pollution, natural disasters; agriculture; and conservation, framing climate change within the broader context of energy and sustainable development; public health and human displacement; social and environmental justice; colonialism and social disparities; urbanization; development; cultural diversity; and gender. The modules provided opportunities for critical thinking, reflection, and internalization about relevant concepts and current issues, with openness to diverse cultural perspectives among the students and instructors.

Over the course of six weeks, the Chicago and Calabar students engaged in group-based guided discussions via the WhatsApp group platform. We created a larger dedicated WhatsApp group for all participants, including instructors and coordinators, to help channel special instructions and other information relevant to the management of exchange activities. Six additional smaller WhatsApp groups that teamed up 4--6 students from each university served as the platform for weekly guided discussions, which covered one topic per week for three weeks.

The discussion covered the impacts of climate change in Nigeria's Niger Delta and Chicago, including impacts on water and land resources, agriculture, energy, city planning,

and conservation. Facilitators (instructors) released the discussion prompts at the beginning of each week, along with links to each week's readings. The students made initial discussion posts by the middle of the week and responded to at least one post from a peer by the last day of the week. We encouraged them to conduct additional research, in addition to assigned readings, and to reflect critically on the questions in the assignment prompts.

As the time difference between the two regions varied between six and seven hours, we implemented a limited number of Zoom-based synchronous meetings. For example, in the first week of the exchanges, we kicked off the program with a Zoom meeting where students shared personal introductions and participated in a comprehensive review of the curricula. Subsequently, they exchanged pictures, stories, experiences, scientific articles, and ideas and worked on joint final projects via Google Docs and Google Slides.

In a mid-program project, at week 3, we asked the students to video record and share their personal experiences with climate change. Collectively, they reflected on and analyzed these personal videos in a WhatsApp group discussion. On Week 4, groups composed of Chicago and Calabar students collaborated on a final project. Guided by community organizations, they identified and interviewed, on video, individuals within their local communities who were experiencing significant impacts from climate change. Students who owned smartphones used them to implement their recordings; we provided video cameras to those who did not own smartphones. Students participated in intensive climate storytelling and recording workshops at Calabar and Chicago prior to and during the GLE projects.

Students placed the interviews with community members on a Google Doc platform, where all their peers had access. By working collaboratively within six groups (impact on water, impact on land resources, impact on agriculture, impact on energy, impact on city planning, and impact on conservation), they analyzed and summarized relevant climate change root causes and impacts from their regions. They also analyzed the similarities and differences in these root causes and impacts between Chicago and Calabar.

In two synchronous Zoom meetings, in Phase Three, between June and July 2023, students from each of the six groups presented their articulations of the regional similarities and differences in climate change root causes and impacts to the whole class. In two separate community screening events, students also presented their results to the community partners and stakeholders in Chicago and Calabar. During the community presentations, the students presented a 30-minute documentary video featuring their cross-national perspectives on the root causes and impacts of climate change in Chicago and Calabar.

We conducted participant observations of the synchronous Zoom presentations and critically analyzed the content of the videos and documentary that the students worked together to create, as well as the WhatsApp group discussions, final group presentations, and reflection journals that they submitted. Finally, we conducted thematic coding of the narratives and discussions, a discourse analysis of cross-cultural communications, a comparative analysis of regional perspectives, and a critical analysis of key learning moments.

To ensure the validity and trustworthiness of the information that the students provided, we triangulated by consulting multiple data sources, such as published news stories, journal articles, and community activists in Nigeria and Chicago. The instructors and coordinators also checked with the students to confirm the accuracy of their

contributions. Finally, we conducted a peer review of the analysis we conducted to determine the consistency of the findings with human experience (Haq et al., 2023).

The emerging themes, which highlighted the benefits of virtual exchange for international education, included the following: 1) the development of cross-cultural understanding and empathy, 2) the enhancement of critical thinking skills, 3) knowledge construction through storytelling, 4) technical and communication skills, 5) enhanced environmental literacy and perspective transformation, and 6) technical and communication skills. These themes are further discussed in the following paragraphs.

RESULTS AND DISCUSSION

By learning from different perspectives, virtual exchange projects help students acquire intercultural and cross-national competencies through synchronous and asynchronous interactions. Students interviewed community members and researched the underlying drivers of local climate change manifestations and their connections to global systems. They created a documentary video for community screenings and developed solution approaches that recognized and integrated global interconnectedness and interdependency. The virtual exchange connected academic learning with local environmental activism and helped students develop community-based research, practice, policy articulation, and leadership skills.

The knowledge they gained underscored their identities as global citizens and climate change ambassadors. They became stewards of global resources with newly acquired capacity to advocate for the sustainable use and management of local, regional, and global natural resources. Students expressed confidence that climate change can be effectively managed "because classes such as this one are attempting to make a change." The themes that emerged from the analysis of student-generated content under each objective were derived from how the virtual exchange facilitated learning outcomes in the study.

DEVELOPMENT OF CROSS-CULTURAL UNDERSTANDING AND EMPATHY

The virtual exchange created meaningful connections between students from Chicago and Calabar and allowed them to understand the impacts of climate change through different cultural viewpoints. Students demonstrated deep empathy by relating to each other's experiences, such as when students from both regions connected over shared experiences of changing seasons and agricultural challenges. When a Nigerian student recounted how climate change negatively affects crop yield in their community, a Chicago student replied,

I'm so sorry to hear about your family's farming difficulties due to climate change... Stories such as yours should be shared more, so that people will understand that climate change impacts everyone. I think many people choose to ignore it because they are not directly impacted; however, stories such as yours would show them that the negative impacts of climate change are significant to everyone.

The program also helped students recognize disparities in climate change impacts between the Global North and South Regions.

The study revealed important distinctions in how students from different cultural contexts approached environmental problem solving. While most Nigerian students deferred to the government to lead climate change action by creating and enforcing policies that can make people change their environmental attitudes and behaviors, most US students acknowledged the role of the government but viewed climate action as essentially the responsibility of individuals and their communities. Nigerian students' greater emphasis on government-led solutions reflects the cultural differences in civic engagement noted by Holdsworth (2010). US students' focus on individual action aligns with Western environmental education traditions described by Stevenson (2007). The exchange facilitated what Reid et al. (2019) termed "sustainability citizenship" across cultural contexts.

ENHANCEMENT OF CRITICAL THINKING SKILLS

In this program, students engaged in comparative analysis of climate change impacts across two regions. They learned to examine environmental issues through multiple frameworks, including historical and colonial contexts, social justice perspectives, and local versus global dynamics. Students also developed skills in analyzing complex systems and interconnections between local and global environmental challenges. These findings connect with emerging scholarship on environmental justice in international education. The students' recognition of disparate climate impacts reflects the growing emphasis on climate justice in environmental education (Stapleton, 2019). The development of critical consciousness about environmental inequities aligns with the objectives outlined by Gruenewald (2003). The virtual exchange facilitated an understanding of what Agyeman (2013) terms "just sustainabilities."

KNOWLEDGE CONSTRUCTION THROUGH STORYTELLING

The use of personal and community storytelling proved highly effective by making abstract climate concepts concrete and relatable and capturing the emotional and human dimensions of climate change. After listening to a presentation on the impact of climate change on flooding, a Nigerian student reflected,

I can relate to this story. I witnessed an incident some years ago when I was traveling from Abuja to Calabar. As we got close to Lokoja, I witnessed a terrible flooding event that happened in a small residential area close to Lokoja main city. I saw people's houses and property like clothing, beds, and other furniture floating on top of the water, and people were forced out of their homes, just standing at a distance watching their property, leaving them.

Video recording and story sharing helped students connect personal experiences to larger systemic issues and created powerful learning moments that resonated across cultural boundaries.

The findings concerning Nigerian students' perspectives connect with the literature on international students' voices and agency. For example, Nigerian students' ability to share their direct experiences of oil production impacts such as environmental degradation and

negative effects on human health allowed them to position themselves as knowledge creators rather than just knowledge receivers, addressing concerns raised by Madge et al. (2009) about international student agency. This finding supports research by Lee & Rice (2007), who showed that international students often feel that their perspectives are undervalued in global academic discussions. This demonstrates what Glass et al. (2015) identify as the importance of creating spaces where international students can meaningfully contribute their knowledge. The virtual exchange format also helped address what Marginson (2014) described as power imbalances that can silence international student voices.

TECHNICAL AND COMMUNICATION SKILLS

Through participating in exchange activities, students gain experience with cross-cultural communication and digital collaboration tools such as WhatsApp, Zoom, Google Docs, and Google Slides. They also gained experience with video production and storytelling techniques and with asynchronous and synchronous international collaboration. Using technology, they work in teams and engage in virtual reflection and analysis to create solutions for complex local and global issues such as climate change mitigation and adaptation.

The virtual exchange format provides insights into international students' experiences in digital spaces. For example, the effectiveness of the WhatsApp platform for facilitating cross-cultural dialog supports Chen and Yang's (2014) findings that technology reduces barriers to international student participation. This finding builds on research by Zhang and Kenny (2010) about international student engagement in online learning and demonstrates what Liu et al. (2010) identify as benefits of asynchronous discussion for international students' participation.

ENHANCED ENVIRONMENTAL LITERACY AND PERSPECTIVE TRANSFORMATION

Through the video recording process and analysis of the recordings, the students gained a deeper understanding of local environmental challenges and changing global patterns. Through reflection, they also gained an understanding of the connections between social justice and environmental issues, as well as cultural approaches to environmental problem solving.

Students advised that current and future climate programming be participatory—equitable, inclusive, and accountable to everyone. A student noted:

First, we should ensure the involvement of everyone who will be impacted by the plan, such as people in the community, businesses, and government agencies. In this way, we can ensure that the plan works for everyone and is supported by the people it will affect.

Students further advised that effective climate change planning must consider "the social, economic, and environmental impacts" and "should think long-term and ensure the solutions we come up with can be maintained and adapted over time," while ensuring that

"vulnerable communities are not impacted more than others and that they have access to the resources and opportunities they need." The perspectives of the students changed as the virtual exchange progressed. They developed ethical and nuanced views of individual versus collective responsibility for climate change solutions, government roles in environmental protection, traditional indigenous and modern approaches to conservation, and local versus global solutions.

CONCLUSION

The virtual exchange enabled students from Nigeria and the US to think critically about the challenges that climate change poses to local communities in both countries. Students contributed insights and perspectives that can positively influence and advance the climate debate and efforts to find effective solutions. They noted that perceptions and beliefs about climate change are largely driven by the media, which may intentionally or unintentionally misinform their audiences. As one student noted,

Media outlets and news segments sometimes make people believe that climate change is too large of an issue to be helped by a single human being. After this course, I learned that it is not necessarily just about one person or myself.

Students noted that it takes a collective effort, supported by individual contributions, to achieve the goal of reaching net-zero carbon emissions locally and globally.

Climate Policy and Practice: While most Nigerian students deferred to the government to lead climate change action by creating and enforcing policies that can make people change their environmental attitudes and behaviors, most US students, while acknowledging the role of the government, viewed climate action as essentially the responsibility of individuals and their communities. Students advised that current and future climate programs should consider the broader social and ethical ramifications of such programs. They urged that the development and implementation of climate solutions should be participatory, inclusive, equitable, transparent, and accountable to everyone. A student cautioned that the implementation of climate change solutions should not impact vulnerable populations more than other groups, and such populations should have access to the resources and opportunities they need to help mitigate the impacts of climate change in their communities.

Many students noted that the political climate in the U.S. appeared to work against effective and significant climate change policymaking and enforcement. They expressed the belief that

As the current political system experiences turnover as politicians grow older and retire, younger politicians will take their places, [and these younger politicians] are typically more open to the use of renewable energy sources than older generations who are accustomed to their fossil-fuel methods of energy production.

They further surmised that it will still require "lobbying, reforms, heavy advocacy... and voting for political candidates who are in favor of progressive changes toward renewable

energy sources and advocating for local use of renewable resources." Considering the hands-off, government-centered, approach to environmental policy and action that Nigerian students articulated, climate-related programs implemented in Nigeria also need to target the strengthening of personal and community agency and capacity building so that individuals and communities can become more engaged and take more responsibility for mitigating climate change impacts. Research has suggested that the Nigerian government does not have a strong record of environmental protection and management (Udoh & Willard, 2023).

Students suggested that culturally appropriate approaches are needed for climate action in Nigeria, and these approaches should "center around community-based land management and attention to indigenous conservation practices and traditions." They believed that applying traditional conservation methods would ensure that efforts to manage climate change receive broad buy-in, are sustainable, and can improve the lives of Nigerians. They called for "a traditional practices revival".

Role of the Next Generation: Many Chicago students indicated that their "generation has a large role to play in mitigating climate change." They reported that previous generations had failed the planet by setting up "a system that has been actively destroying the climate over the course of the last few decades." They proclaimed that they have a "responsibility to not only develop alternatives, but to implement them, as current attempts to replace hazardous practices, especially in the U.S., have largely failed." They believed that they could start by taking concrete steps that included "spreading accurate information, fighting misinformation, and teaching sustainable practices" to friends, family, and coworkers. Other steps include recycling, including supporting local "buy and sell" programs where used items such as furniture, clothing, and appliances are resold or given away instead of being sent to landfills.

As a Chicago student advised,

Instead of driving to the CVS down the block from your home, walk for 10 minutes. We cannot change the whole world, but you as an individual have more power than you think to make a difference. I love my car, but I have been biking to work or using an electric skateboard to travel around. Just doing that has led to my contributing less to pollution.

Another student commented:

I started to use less plastic and paper to make this environment better. Some people may think this is silly because what's the use of it if it is just one person? However, the others are not doing it. However, I believe one person is still better than nothing. In addition, I hope people around me can see what I do and start to understand and probably start to do their little things as well to create a better environment for the future.

Other students planned to buy local and organic food to lower their carbon footprint, reduce waste, start community gardens, plant trees, and promote environmental education.

The students believed that "Small steps, when taken collectively, can have a significant impact." Small steps by individuals and communities can augment the more systemic efforts that are currently being taken by other sectors, such as renewable energy, transportation, agriculture, and waste management, to develop cleaner and more sustainable practices. As the students concluded, "ultimately, addressing climate change requires a multifaceted approach involving individuals, communities, governments, and industries. Working together gives hope for a more sustainable and resilient future."

Implications for Research and Practice: The findings of this study suggest several important considerations for supporting international students' scholarly and professional experiences. They demonstrate the need to create platforms and digital tools that validate international students' knowledge contributions and enable their voices. International students play a critical role in challenging dominant academic perspectives (Bai & Wang, 2024). This analysis suggests that virtual exchange can effectively support international student engagement while addressing common challenges in international education. The study particularly contributes to an understanding of how international students navigate cross-cultural academic spaces, contribute local knowledge to global discussions, challenge dominant Western perspectives, and engage through digital platforms.

The findings of this study suggest several important considerations for international education research and practice. They demonstrate the need for structured reflection to support intercultural learning (Qin, 2024; Deardorff, 2006) and the importance of balancing local and global perspectives (Sobel, 2004). They also highlight the value of technology-mediated exchange for environmental education (O'Dowd, 2018) and the role of storytelling in building cross-cultural understanding (Agyeman, 2013). These connections to the literature suggest that virtual exchange can effectively support international students' development of environmental and intercultural competencies while addressing the limitations of traditional mobility programs (Li et al., 2024). The study contributes to the areas of the integration of place-based and global learning, the development of critical environmental consciousness, technology-mediated intercultural exchange, and cross-cultural approaches to environmental solutions.

The study findings also suggest important implications for future research. Future research should further explore the long-term impacts of virtual exchange on students' environmental behaviors. The role of virtual exchange in developing environmental leadership and the integration of indigenous environmental knowledge should be further examined. It is imperative to further explore the long-term impact of virtual exchange on international student agency and the effectiveness of different digital platforms for international student engagement. Future research should also examine ways to better integrate international students' local knowledge, as well as strategies for supporting international students' cultural navigation in virtual spaces.

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