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“A Multimethod and Interdisciplinary Approach to Educating Postsecondary Students on Arctic Challenges and Governance”

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ABSTRACT

Challenges to the Arctic region abound and intersect. Warming, ice and permafrost melting, and pollution jeopardize health and food security of Indigenous and other Northern communities. Problems related to natural resource extraction and shipping are developing. Because these issues cross sovereign boundaries, they must be addressed multilaterally. The Arctic Council is the principal forum in which Arctic states and Indigenous groups address shared concerns in the region. We co-administered a five-day program on science and diplomacy in the Arctic at Dartmouth College in June 2017 to educate postsecondary students on Arctic challenges and governance, foster skills and confidence related to leadership and diplomacy, and inspire civic action in Arctic and international affairs. The program consisted of lectures, discussions, a teamwork and collaboration exercise, a negotiation workshop, and a Model Arctic Council (MAC)—a simulation of delegates’ work in the Arctic Council. We found that students had strongly positive perceptions of the curriculum and felt that they accrued Arctic-related awareness and skills, while developing enthusiasm for engaging in civic affairs. Students attributed the program’s value to the use of multiple pedagogies, especially simulation, an interdisciplinary environment, and mentorship from and engagement with Arctic Council and other practitioners.

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Introduction

In a globalized world that faces myriad challenges ranging from climate change to limited opportunities for sustainable development, the Arctic has attracted interest from policymakers, academics, and journalists. Warming is occurring in the Arctic at significantly higher rates than at lower latitudes (U.S. Global Change Research Program 2018), threatening the well-being of not only the region’s inhabitants but also societies around the world. Researchers expect sea levels to continue to rise through the twenty-first century, with impacts varying by location depending on numerous factors (Nicholls and Cazenave 2010). The transnational challenges the Arctic region faces call for multi-lateral solutions. The Arctic Council, a high-level intergovernmental forum established

in 1996, has matured as an institution and facilitated several notable agreements through the collaborative efforts of its eight Member States and six Permanent Participant groups representing Arctic Indigenous peoples.¹ This young forum and the region itself are ripe for study and rich with opportunities for civic participation, given the unique features of the Arctic Council, the dynamic character of the region, and its small population. The underpeopled setting affords committed individuals opportunities to influence the region's future. As a focus of study in university programs, the Arctic invites students to discover the potential of collaborative, multinational, multicultural, and interdisciplinary approaches to problem solving.

This article assesses the value of multimodal methods and interdisciplinary approaches to learning about the Arctic and its governance, drawing on participant feedback on a five-day educational program. The US-Canada Arctic Science Diplomacy and Leadership Workshop & Model Arctic Council program took place at Dartmouth College in Hanover, New Hampshire, in late June 2017. The program engaged 25 graduate and undergraduate students, mostly American and Canadian, and emphasized science diplomacy and leadership skill building in the Arctic context. The program included students' submission of policy papers prior to their arrival, lectures by Arctic scholars and practitioners, formal and informal discussions, a teamwork and collaboration exercise, a negotiations workshop, and a Model Arctic Council (MAC). The MAC, during which students simulated the work of the Arctic Council, comprised the central component of the program, running half its length. Students acted as delegates from the eight Arctic Member States, six Permanent Participant groups, and official Observers as they deliberated on an Arctic Council project, Operationalizing One Health in the Arctic.¹ Students produced a final Declaration expressing their recommendations, mirroring the Declaration that the Member States produce at the conclusion of each two-year chairmanship of the Arctic Council.

We evaluate the extent to which students perceived that the program achieved its desired outcomes: to educate on the Arctic and its numerous challenges and opportunities, to foster skills and confidence related to leadership and diplomacy, and to inspire civic action in Arctic and international affairs. We also identify the primary factors contributing to students' perceptions of the program's benefits and limitations. In brief, students reported strongly positive perceptions of the curriculum, increased awareness and skills related to Arctic and international affairs, and enthusiasm for engaging in civic affairs. Students perceived high educational value in the use of multiple pedagogies, especially simulation; an interdisciplinary environment; and mentorship from and engagement with Arctic Council and other practitioners. Based on our findings we recommend the use of simulation pedagogy, complemented by lectures and other interactive exercises, and an interdisciplinary approach to provide students with a highly engaging learning experience that approximates real-world situations.

Background: The Arctic region and Arctic Council

The end of the Cold War and the collapse of the Soviet Union fostered communication between the East and West in the Arctic. The post-Cold War era allowed residents of the far North and Arctic to conceive of the areas they inhabit as a distinct region with

common demographic, economic, social, and geographic conditions and challenges. With opened communication channels, Finland and Canada took the lead in proposing a formal institution to facilitate collaboration among the Arctic states and Northern Indigenous communities in addressing these common challenges. The 1991 Rovaniemi Declaration on the Protection of the Arctic Environment with its implementation program, the Arctic Environmental Protection Strategy (AEPS), led to the 1996 Ottawa Declaration, the Declaration on the Establishment of the Arctic Council. The Council's broad mandate focused on environmental protection and sustainable development, challenges especially pressing in the region, given the rapid pace of warming and high concentrations of contaminants in the region—threats generated primarily elsewhere in industrialized areas of the world—and the limited forms of sustainable economic development in the region. The institution's mandate explicitly excludes peace and military matters. The Arctic Council's rotating chairmanship among the eight Member States constitutes a distinct feature of the institution that reflects its egalitarian norms.

Six Working Groups manage Arctic Council initiatives, each addressing a set of Council priorities like emergency management or marine environment protection.² The Working Groups often delegate targeted problems to task forces and reach out to the scientific community to endorse or encourage specific research. Delegates discuss issues and potential solutions, weighing Member State, Permanent Participant, Observer, and outside expert perspectives before coming to consensus on moving recommendations forward to the Senior Arctic Officials (SAOs) for their consideration. The SAOs, with Permanent Participants at the table, examine Working Group proposals from their respective governments' perspectives and facilitate communication among all parties. They synthesize scientific findings and Working Group objectives into language ready for Ministerial endorsement. Thus, the Ministerial Meetings, which occur once every two years at the culmination of a chairmanship, are largely ceremonial, proposals having been thoroughly scrutinized prior to these high-profile events.

The Arctic Council's most distinctive features, in addition to the rotating chairmanship, include (a) the prominent role it provides for Indigenous peoples, as represented by the six Permanent Participants, and (b) its consensus requirement for all decisions. Although only the eight Member States have voting rights, the Permanent Participants have full "consultation rights," and proposals gain Council support only after their views have been well heard and incorporated and after *all* Member States have approved them. Consensus norms permeate all levels of decision making, promoting cordial deliberations and trust among delegates. These inclusive norms and the Council's focus on common concerns while avoiding military issues distinguish the Council from other institutions. For example, although the United Nations and European Union make some decisions unanimously, they use majoritarianism in voting and their delegates often deliberate more contentiously.

The Council has been recognized as a *policy-shaping* institution as its effectiveness in initiating and supporting scientific assessments, pursuing projects that address critical regional needs, and influencing international environmental policy have attracted attention (Kankaanpää and Young 2012). In recent years, it has initiated three significant cooperative agreements: (1) the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic (SAR Agreement), signed in Nuuk,

Greenland, in May 2011, and entering into effect in January 2013; (2) the Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (MOPPR) agreement, signed in Kiruna, Sweden, in May 2013; and (3) the Agreement on Enhancing International Arctic Scientific Cooperation, signed in Fairbanks, Alaska, in May 2017.³

As the Arctic Council neared the twentieth anniversary of its founding, having demonstrated its capacity to foster collaboration toward positive ends and even to shape policy, it was an opportune time to use the institution as an educational tool to teach students about the pressing issues facing the Arctic and to prepare them to take on leadership roles in the region.

The UArctic Model Arctic Council program

In 2015, we (Ehrlander and Boylan) initiated a Model Arctic Council (MAC) Thematic Network within the University of the Arctic (UArctic), a network of universities and other institutions engaged in education and research on the Arctic. Establishing the MAC within the UArctic would institutionalize the program and facilitate collaboration with colleagues throughout the Circumpolar North to develop individual MAC programs. The goals of the UArctic MAC initiative are to (1) develop students' knowledge of the Arctic as a region, Circumpolar politics, and Northern Indigenous peoples; (2) increase students' understanding of Arctic Council objectives and processes; (3) prepare students to assume leadership roles in the Circumpolar North; and (4) further student and faculty collaboration within the UArctic.⁴ We anticipated that simulation pedagogy and the intercultural and international exchange would enhance student experience and learning outcomes.

We envisioned an international MAC taking place in even years at a UArctic university in the country chairing the Arctic Council, with smaller, regional MACs taking place in odd years. Thus, we organized the first fully international MAC at our home university, University of Alaska Fairbanks (UAF), in March 2016 during the 2015–2017 U.S. chairmanship of the Arctic Council and in conjunction with an Arctic Council Senior Arctic Officials meeting in Fairbanks, Alaska. At the close of that program, the UArctic accepted responsibility for hosting the next fully international MAC during the 2017–2019 Finnish chairmanship of the Arctic Council; this program took place at the University of Lapland in Rovaniemi, Finland, in fall 2018. Meanwhile, Dartmouth College hosted the first regional UArctic MAC as a central component of the program in June 2017.

The Arctic Science Diplomacy program

Together with Melody Brown Burkins at Dartmouth College, we developed the Arctic Science Diplomacy program based on our experience administering the Model Arctic Council at the University of Alaska Fairbanks (Ehrlander and Boylan 2018) and insights from the literature on simulation pedagogy and interdisciplinarity. Since the 1992 United Nations Framework Convention on Climate Change (UNFCCC), followed by the 1997 Kyoto Protocol, public awareness of science diplomacy has expanded. The concept has a long history, however, with several noteworthy efforts and agreements

pertaining to the polar regions. These include the International Polar Year, which institutionalized coordinated international research activities in the Arctic, first in 1882–1883 and most recently in 2007–2009, and the 1920 Svalbard Treaty, which provided for Norwegian sovereignty over the archipelago to promote peaceful economic development, laying the groundwork for later international cooperation in Arctic research on the islands. During the 1940s and 1950s, as the Cold War became entrenched, science diplomacy achieved two landmark agreements with the International Geophysical Year (1957–1958), which guaranteed freedom of space, and the Antarctic Treaty (1959), which safeguarded the continent for peaceful pursuits in the interest of science and progress for all of humanity (Berkman 2011). The end of the Cold War inspired interest in global cooperation just as awareness of the imminent dangers of climate change demonstrated the urgency of such multilateral efforts. The establishment in the 1990s of the Arctic Council, whose primary mission was environmental protection, exemplified science diplomacy, and its two-decade history demonstrates the value of such institutionalized collaboration. Placing science diplomacy at the center of the 2017 program highlighted its central function in Arctic politics and played to the strengths of our co-organizer, Melody Brown Burkins at Dartmouth College.

Given variation in students' dominant learning styles, we used a variety of pedagogical approaches during the program. The literature argues that integration of teaching strategies can be effective in achieving desirable educational outcomes (Cadotte 2016; Erickson 2013; Francisco, Nicoll, and Trautmann 1998; Jaleniauskiene 2016; Pluta, Richards, and Mutnick 2013; Zapp 2001). Our program included reading and producing policy papers prior to the program, lectures, formal and informal discussions, a teamwork and collaboration exercise, a negotiation workshop, and a simulation, with the simulation dominating the program.

Scholarship shows that bringing theory and practice together through simulation produces improved learning outcomes (Asal 2005; Van Dyke, DeClair, and Loedel 2000; von Meding et al. 2016; Youde 2008). The performance requirement in simulations demands a higher level of preparation and engagement than does conventional classroom participation. Students must grasp the reading material and internalize their roles to play them effectively. Scholars have observed this effect in models of the United Nations (Hazleton and Jacob 1983) and European Union (Zeff 2003). In another study (Ehrlander and Boylan 2018, 85), we found simulation pedagogy to be effective in teaching about the Arctic region, the Arctic Council, and Indigenous and other cultures, concluding that “the novelty of the program, the work on Arctic Council priorities, and the remarkable cultural diversity of the students heightened the learning experience.”

We also designed the program to be interdisciplinary; that is, to apply multiple traditional disciplinary approaches to a field of study (Lowe, Phillipson, and Wilkinson 2013; Petrie 1992, 304; Spelt et al. 2009, 266). Regional studies programs, such as European studies, Middle Eastern studies, and Arctic and Northern studies, use multiple and interdisciplinary lenses, recognizing the interaction of myriad forces on conditions in the region. Teaching about the Arctic and the work of the Arctic Council lends itself to interdisciplinarity, which aims to systematize ways of helping people solve practical problems, transmit culture, and integrate epistemologies (Petrie 1992, 327–328). The literature's affirmation of the value of interdisciplinarity in academic environments

motivated us to design the program so that organizers, speakers, practitioners, and participants represented a variety of fields.⁵ The simulation's focus on the Arctic Council-endorsed One Health initiative required the engagement of the human, animal, and environmental sciences.

Dartmouth College was an ideal host for the first regional UArctic MAC. Melody Brown Burkins is co-lead on the UArctic Model Arctic Council Thematic Network. The College has historical and longstanding ties to the Arctic and to Arctic studies concentrated in its John Sloan Dickey Center for International Understanding and in its curation of the Stefansson Collection of Polar Exploration. Dartmouth College is co-lead for the State Department Fulbright Arctic Initiative and hosts the U.S. Ice Drilling Program in its Thayer School of Engineering. Drawing on Dartmouth's expertise, the June 2017 program emphasized science diplomacy, leadership, trust building, and negotiation skills. The Dickey Center's Canada Institute Endowment supported the program that engaged primarily U.S. and Canadian students.

The 25 student participants in this regional Model Arctic Council came from 14 U.S. and Canadian universities.⁶ They ranged from second-year undergraduate students to PhD students, with most in Masters programs, and their studies spanned the humanities, social sciences, and natural sciences. A few of the students lived in Arctic or sub-Arctic regions, some were enrolled in Arctic or Circumpolar Northern studies programs, and others had taken a course or two on Arctic topics. Most of the graduate students' research focused on Arctic-related topics.

Feedback from the MAC 2016 program at the University of Alaska Fairbanks guided our preparations for the Dartmouth program. We and our colleagues at Dartmouth strove to strengthen the simulation portion of the program and achieve the optimal complement of orientation exercises, lectures, trainings, simulation, and experiential learning. We emphasized building leadership and civic engagement capacities.

Students prepared for the program by reading a selection of publications on the Arctic region, the Arctic Council, and One Health, as well as Fisher, Ury, and Patton's *Getting to Yes* (1987). Participants' tendency toward adversarial posturing during the MAC 2016 led us to assign selections from *Getting to Yes* and include a negotiation workshop in the 2017 program. Organizers assigned students to roles as Senior Arctic Officials, Permanent Participant delegates, Member State delegates, or official AC Observers. To give Observers, whose participation within the AC is limited, more challenging roles, we doubled them as Member State Ministers, whose roles are largely ceremonial. We required students to research and submit policy papers on emergent health concerns in their assigned regions and their entities' positions relative to those concerns, in accordance with the literature that preparation increases interest in the simulation (Duchatelet et al. 2018) and improves research skills (Glasgow 2014).

The five-day program began with a keynote address by a local tribal elder, followed by welcoming remarks from Melody Brown Burkins, the lead program organizer and host, after which students engaged in outside teamwork and collaboration exercises designed to build trust and empathy, concepts essential to collaboration and consensus building within the Arctic Council. Following a picnic lunch, participants reconvened indoors for a panel discussion on science diplomacy in the Arctic. Finally, Kah Walla, a Cameroonian leader, spoke on her political engagement as she encouraged the students

to commit to civic activism. The second day began with a panel of speakers on topics surrounding Indigenous governance in the North, including Edward Alexander, Gwich'in Council International representative, who stressed the need for leadership in the Arctic and urged students to begin thinking of themselves as leaders now. Next, to prepare students for the consensus-style decision-making process they would simulate, Sean Nolon from Vermont Law School led students in a negotiations workshop that exposed them to an array of tactics to move discussions forward constructively. These two morning sessions proved especially impactful for students, convincing them of the significance of the work they would undertake and orienting them toward effective approaches to negotiation. In the afternoon, to immerse students in the subject matter of the coming Model Arctic Council simulation, Tina Woods, from the Alaska Native Tribal Health Consortium, lectured on holistic approaches to health and well-being among Alaska Natives. That evening, at a formal dinner, students engaged with the distinguished scholar of Arctic politics, Oran Young, who spoke on the 2017 Agreement on Enhancing International Science Cooperation.

The third day opened with a lecture on the Arctic Council by Ehrlander and Boylan, followed by a panel discussion by students who had participated in the 2016 MAC in Fairbanks. Panelists emphasized lessons learned and lasting value from their first MAC experience. Following the student panel discussion, Edward Alexander lectured on Arctic Council norms and practices. The afternoon began with a discussion among Edward Alexander, Ann Meceda, and Troy Bouffard on their experiences as Arctic Council delegates. With the students now primed for the simulation, the Model Arctic Council (MAC) portion of the program began.

During the MAC, participants simulated the work of the Sustainable Development Working Group (SDWG) on One Health in the context of climate change. Established in 1998, SDWG represents the “human face of the Arctic,” focusing on social equity, economic development, and protection of the environment. It strives to build practical knowledge and foster capacities among Indigenous peoples and Northern communities as they respond to the challenges and opportunities associated with living in the Arctic. Increasingly, SDWG has engaged with the other working groups because all address concerns that affect Arctic peoples, and SDWG delegates want to ensure that Indigenous voices are heard in all the Arctic Council’s work. Operationalizing One Health in the Arctic is just one of the projects SDWG has adopted in recent years to further health, wellness, and social inclusion.

The One Health paradigm, which recognizes the interdependence of human, animal, and environmental health and well-being, emerged in the 19th century and gained salience in the 20th century, especially among specialists in zoonotic diseases (Ruscio et al. 2015). Increasingly, professionals in various fields in the far North have appreciated the usefulness of this holistic approach to wellness, given the close connection that humans, especially Indigenous peoples, tend to maintain with their environments. Rapid warming and environmental contamination have increased uncertainty and heightened environmental risk, threatening both individual and community health and well-being (Hueffer et al. 2019). In May 2017, the Arctic Council adopted the project Operationalizing One Health in the Arctic, aiming to forge “co-equal, inclusive collaborations across multiple scientific disciplines and Arctic communities, to enhance

resiliency of the Arctic inhabitants through an enhanced understanding of climatic change impacts on health risks to people, animals, and the environment” (Sustainable Development Working Group 2017).

Recognizing the challenges surrounding effective communication in the field of public health, especially in the remote, sparsely populated, multi-ethnic regions of the Arctic, we designed the MAC 2017 to direct students’ energies towards communication of health-related information. Students’ work fell into two stages: (1) identifying emergent health concerns related to climate change and (2) creating Communication Action Plans (CAPs) to disseminate critical information to communities, first responders, policymakers, health authorities, the media, and the general public.⁷

Prior to the program, students prepared for their roles by investigating the foremost emergent climate change-related threats to human, animal, and ecological health in their assigned regions. Throughout the program, Edward Alexander, Gwich’in Council International, and Ann Meceda, U.S. delegate to the Arctic Council Sustainable Development Working Group, mentored and advised the students between sessions. Alexander provided resonant advice to students, encouraging them to resist the urge to speak at length or repeatedly and instead listen more to others. This, he said, was much more in keeping with Arctic Council norms than the adversarial tone that some were taking. During the first simulated SDWG meeting, student delegates created an extensive list of emergent health concerns, which they reduced in the following session to five broad categories: food insecurity, pollution, spread of infectious diseases, threats to mental health, and water insecurity. Working in small groups, participants developed their preliminary proposals, which they presented to the student Senior Arctic Officials (SAOs) to elicit their advice. Following “intersessional” revisions, leads for each CAP presented their revised proposals in a second SAO meeting, during which delegates and SAOs polished CAP language until they achieved consensus. In the subsequent Ministerial meeting, the Ministers of the eight Arctic states approved and signed the Hanover Declaration, which expressed delegates’ priorities on climate-related health concerns in the Arctic and articulated their CAPs. The students’ achievement, in such a short time, of a coherent expression of their consensus on these priorities, along with effective CAPs, gratified students and organizers alike. At a formal closing ceremony, organizers acknowledged each participant with a certificate of participation and recognized the three strongest performances and the writers of the three strongest policy papers. Student participants chose one of their peers for the Students’ Choice Award for most impressive performance, and she read the Hanover Declaration aloud during the ceremony.

Evaluating program data

As MAC Thematic Network leads, we prioritize the long-term strength and viability of the UArctic Model Arctic Council by helping to organize and oversee individual programs. We aspire to improve the program with each iteration; toward that end, we actively observe each program and seek participants’ feedback on their experiences. With an eye toward our program objectives, we gather both quantitative and qualitative evaluations from students on their perceptions of the program’s value. The 2017

program objectives were to (1) educate students about the Arctic and the challenges and opportunities that individuals and communities in the region face; (2) cultivate skills and confidence in students' leadership and diplomacy capabilities, preparing them for future educational and employment opportunities; and (3) inspire and mobilize students to engage in civic affairs. These goals resemble the aims of other simulation organizers, such as Desai and Bedi (2017), who focus on developing soft skills, global citizenship, and critical thinking in a business context.

We derive our quantitative data from responses to closed-ended questions on a participant survey. Qualitative data come from a collective debriefing with the students, responses to open-ended questions on the survey, and a focus group session with students who participated in both the UAF and Dartmouth programs. Because we conducted the survey in person, we achieved a high response rate (92%).⁸ We conducted the focus group, debriefing, and survey towards the end of the program. We audio recorded the focus group and debriefing and later transcribed them.

We divide our analysis into two parts. First, we evaluate the extent to which students thought that the program achieved its desired objectives and their expectations. Second, we identify and discuss the key factors that students believed contributed to the program's strengths and weaknesses.

To what extent did students judge the program successful?

We analyzed students' responses to survey statements regarding knowledge acquisition, skills building, and enthusiasm for civic engagement. With an average response of 4.57 (of 5) on a Likert scale, students agreed with our statement: "My knowledge of the Arctic increased during this program."⁹ With the statement: "I learned about how science and diplomacy are responding to the challenges we currently face in the Arctic," students agreed, with an average of 4.48. Students registered their strongest agreement with a statement on the MAC component of the program: "My knowledge of the Sustainable Development Working Group's One Health project increased during this program," with an average of 4.74. The strength of the students' agreement with these statements suggests that they learned much about the Arctic, science and diplomacy, and the One Health project. Table 1 summarizes these findings.

The qualitative feedback also indicates that students found the program effective. Many students reported strongly positive perceptions of the educational value of the program. One student wrote, "I came in with a lot of fear and worry but am so glad that I participated. It was an incredible and truly enjoyable learning experience." In the debriefing, participants expressed appreciation for the program's emphasis on collaboration toward positive ends, especially given the contentious political discourse in the United States at the time and the worrisome international context. One student said, "we live in a world where there's a lot of uncertainties and unknowns. But learning about the Arctic Council and being able to participate in this model Arctic Council really shows that consensus ... is still possible." Students' reported knowledge acquisition from the simulation corresponded with similar findings in other studies. For example, Mariani and Glenn (2014) find from their simulation that students experienced significant increases in their self-assessed understanding of the political process.

Table 1. Measuring perceived knowledge acquisition.

Survey statement	Average level of agreement (of 5)	Minimum (1)	Maximum (5)	Standard deviation
"My knowledge of the Arctic increased during this program."	4.57	4	5	0.507
"I learned about how science and diplomacy are responding to the challenges we currently face in the Arctic."	4.48	4	5	0.511
"My knowledge of the Sustainable Development Working Group's One Health project increased during this program."	4.74	4	5	0.449

N = 23

Table 2. Measuring perceived skills development.

Survey statement	Average level of agreement (of 5)	Minimum (1)	Maximum (5)	Standard deviation
"I developed <i>diplomacy skills</i> through my participation in this program."	4.57	3	5	0.590
"I developed <i>negotiation skills</i> through my participation in this program."	4.57	3	5	0.590
"I developed <i>communication skills</i> through my participation in this program."	4.57	4	5	0.507
"I developed <i>networking skills</i> through my participation in this program."	4.70	4	5	0.470

N = 23

To elicit students' perceptions of leadership and diplomacy skill acquisition, we posed a series of statements on the survey. Students agreed with the following statement, with an average of 4.65: "I learned about the unique diplomatic culture of the Arctic Council in this program." They agreed with the following statement, with an average of 4.74: "I developed knowledge and skills through participation in this program that will enhance my leadership capacities." We separated statements about developing diplomacy, negotiation, communication, and networking skills through the program, and their levels of agreement averaged 4.57, 4.57, 4.57, and 4.70, respectively. These observations correspond with Mariani and Glenn's (2014) findings that simulation fosters persuasion and teamwork skills. Table 2 presents these findings. We believe participants' strongly positive responses reflect our greater emphasis in this second MAC program on building participants' leadership and diplomacy skills, including the negotiation workshop that preceded the Model Arctic Council.

Many students were struck by the importance of oral communication skills and word choice during negotiations. In the debriefing session, one remarked, "I think the most useful thing I learned here was the negotiating skills, as well as the little nuances of speech ... these are actually really useful skills that if I apply ... to my own science and research ... can be really powerful." Another commented, "I was surprised and incredibly pleased by how well everyone was able to articulate their thoughts in a clear, coherent manner, and an incredibly persuasive manner. I think that whether you're in the policy sphere or in the science sphere, everyone here is going to be able to make a good quality message and communicate that effectively."

During the focus group, a student mentioned learning the value of being succinct when negotiating and being appreciative, rather than frustrated, when another delegate makes one's own point. Another emphasized trying to understand others' points of view: "In terms of diplomacy ... you need to ... see things from a multiplicity of perspectives and you have to be able to communicate across those perspectives." These comments reflected Alexander's reminder of the consensus-oriented process of the Arctic Council and the delegates' prioritization of listening over speaking.

Many comments from the open-ended sections of the survey highlighted diplomacy and negotiation-skills acquisition and activities designed to improve soft skills and measured speech. Students recognized the performance value of the simulation in skill building. One student wrote: "Learning by participating enhances confidence, problem solving, thinking on your feet." Another expressed enhanced self-confidence: "I was pretty nervous but [in] the simulation, I was forced to practice skills I didn't know I had." Another reported: "I think networking and building connections with others has been invaluable."

To elicit students' perceptions of program success in inspiring them to commit to civic engagement in local to global arenas, we posed the statement: "The program has motivated me to engage in civic activity." They responded with an average of 4.35, indicating that encouragement toward civic engagement resonated well with them. Our qualitative data elucidate the aspects of the program students found most inspiring. In the debriefing, one student declared, "there was no way not to come out of it [the MAC] and want to spend the rest of our lives making a difference in the ways that we've ... been doing in a mock context." Several students praised the program's lecturers. One remarked: "It's actually amazing getting to hear who you all gathered to come speak to us ... Ed Alexander said ... we don't realize how close we are to actually doing this ... he said ... you're not even two steps away, if that, from actually being in what's going on." Simulation's ability to encourage civic participation is a key takeaway in other studies, as well (Bernstein 2008; Malone and Julian 2005).

The presentations and engagement of Arctic Council delegates and other civic activists clearly encouraged and inspired students to commit to civic engagement themselves. One student captured the overall effect of the program with this comment: "Now and into the future, I think we can all take what we've learned here and try to make a difference, whether or not it's in climate change or the Arctic." Several students found their interactions with other students especially stimulating. On the survey, a participant identified a strength of the program as bringing together diverse, engaged, and passionate students, faculty, and advisors.

Interestingly, program evaluations did not differ statistically by gender, education level, country of study, previous education on the Arctic, or study abroad experience. These findings suggest that the program is accessible and valuable to university students interested in the Arctic regardless of their backgrounds or academic preparation. The students' selection of an undergraduate participant without previous MAC experience as the most outstanding performer supports this conclusion.

Debriefing, focus group, and survey comments, as well as spontaneous student feedback throughout the program, suggest that students believe we met our program objectives of teaching content on the Arctic, building diplomacy and leadership skills, and

inspiring civic activity. They engaged not only in the negotiation workshop and MAC simulation, which required active participation, but also in other components of the program, from the orientation exercise to the lectures.

What contributed to students' perceptions of the program's strengths and limitations?

We designed the program to further our objectives. The program was intercollegiate, with 25 graduate and undergraduate participants from 14 colleges and universities. It was interdisciplinary, with students and faculty representing a wide range of disciplines in the natural and social sciences. Moreover, we incorporated a spectrum of pedagogical approaches, including lectures followed by question periods, participatory exercises, role playing, mentoring, and informal discussions and socialization. Finally, organizers stressed leadership capacity building and commitment to civic participation, inviting inspiring civic leaders and scheduling a negotiation workshop prior to the MAC, to foster students' diplomacy skills as they strove for consensus during the simulation.

Nonetheless, some aspects of the program furthered our objectives more than others. On the survey, students ranked the components in the following order, from most valued to least: (1) simulating the work of the Arctic Council, (2) interacting with students, (3) interacting with faculty and administrators, (4) listening to lectures, (5) participating in the negotiations exercise, (6) researching and writing the policy paper, (7) participating in the outdoors orientation exercise, and (8) being a part of the Dartmouth College environment. However, no component received an average score less than 4 (of 5); thus, students overwhelmingly appreciated all aspects of the program.

From the qualitative data, we identified four prominent themes regarding student perceptions of program strengths and weaknesses. First, students expressed appreciation of our multimodal approach to teaching. On the survey, a student wrote, "there was a good mix of lecture-based, experiential based, and informal learning opportunities ... I really enjoyed the progression/structure of the program." Another praised the combination of teaching elements, all contributing to learning—lectures, simulations, and participants and leaders from many different backgrounds. A focus group participant commented: "I think the diversity of the program leading into the simulation [enhanced] ... our ability to get the most out of the experiential learning aspect of this program. I really enjoyed the simulation that we did ... Kah Walla was amazing ... talking about what it means to be a leader." These reflections correspond with the literature cited above on the benefits of multimodal education.

Second, much of the praise expressed on the survey regarded the simulation exercise. One student wrote, "By immersing ourselves in this environment, we really got to understand the actual process and role of the AC [Arctic Council]." Another participant wrote: "Participatory learning and person-to-person knowledge exchange beat the traditional classroom any day." Another student "appreciated the hands-on nature of the mock Arctic Council." This echoes our finding in another study (Ehrlander and Boylan 2018) on students' perceptions that simulation provides high educational value.

Interestingly, the simulation also received most of the constructive criticism students offered. Critiques centered on lack of clarity in instructions and expectations. On the survey,

one student noted the need for stronger guidelines for the required policy paper and speeches. In the debriefing, students commented that the directions for the simulation were not always clear. In the focus group, alumni from the MAC 2016 program said that more procedural questions and confusion arose during the 2017 program. Although we scheduled a training session prior to the simulation, the discussion veered off topic, highlighting features of Arctic Council Working Group negotiations rather than training students on meeting protocols. To address this weakness in the future, we will spend more time instructing students on how to proceed in the simulation and on fielding questions. We also may offer a practice run, as one student suggested on the survey.

A related point that arose in the feedback was the desire for a better balance between authenticity and education during the simulation. In the debriefing, one student critiqued the “emphasis on trying to keep it authentic when maybe there was something to be gained by ... stepping out of the roles for a minute to ... [provide] a valuable learning experience for all of us.” On the survey, a student noted “too much effort on ‘protocol’ and procedures.” This point of criticism reflects Cadotte’s (2016, 9) observation that simulations struggle to balance ease of use with realism and accuracy; when simulations prioritize realism over accessibility, students express dissatisfaction. Following von Meding et al. (2016), we will use participant feedback when designing the next simulation. We plan to pause before or after simulation sessions to clarify procedures and reflect on language and points of convergence and divergence with Arctic Council negotiations.

Third, participants commended the interdisciplinary nature of the program. Qualitative comments identified the program’s interdisciplinarity and their interaction with students from a variety of disciplines as program strengths. In the debriefing session, some students said that prior to the simulation, the very notion of policymaking had intimidated them but that the experience had awakened them to the critical relationship between science and policy. Participants in the natural sciences especially appreciated experiencing how scientific findings translate into policy. One commented: “coming from a science background, it’s hard to conceptualize ... how science guides policy ... I’d never ... known about policy, how it goes from an idea to a document and the amount of work that goes into it.” Another appreciated learning how “different aspects of our military interact with science and policy and the Arctic.” Another captured many students’ appreciation for the holistic, multidimensional approach of the program: “I think that this exercise we’ve done here really reaffirms that need to draw those connections between different fields, different cultures, different areas of study and research, to make sure that we don’t view things through a one-dimensional lens.”

On the survey, as well, students noted interdisciplinarity as a program strength. One wrote: “As a scientist, I had an unclear/ambiguous understanding of deliverable/tangible effect[s] of AC [Arctic Council] ... meetings and declarations—participating really helped clear that up.” Another praised the “connection and collaboration of multiple disciplines.” Other studies also note the value of simulation’s emphasis on interdisciplinarity (Desai and Bedi 2017; Dillon, Noble, and Kaplan 2009; Rodehorst, Wilhelm, and Jensen 2005).

A final prominent theme emerging from the qualitative data was students’ appreciation of the coaching and other interactions with the program’s practitioners. These

Table 3. Evaluating representativeness of qualitative themes.

Survey statement	Average level of agreement (of 5)	Minimum (1)	Maximum (5)	Standard deviation
"I believe I learned <i>more</i> about the Arctic, One Health, and science and diplomacy in the Arctic in this program <i>than I would have by spending a similar amount of time in a traditional classroom environment.</i> "	4.65	1	5	0.885
"I believe I learned more about the Arctic and One Health through simulation <i>than I would have by another instructional method.</i> "	4.13	2	5	0.968
"My interaction with students from various disciplines enhanced my learning about current challenges in the Arctic."	4.87	4	5	0.344
"My engagement with leading experts in policy and academia enhanced my learning about the Arctic."	4.83	4	5	0.388
<i>N</i> = 23				

individuals clearly had a powerful impact on the students. They highly praised Edward Alexander of the Gwich'in Council International and Ann Meceda of the U.S. State Department. The initial SDWG meeting, as participants clamored to identify numerous emergent concerns, felt chaotic, partly owing to inadequate instruction on process and protocols. Feedback from organizers the following morning, particularly Alexander's insight that Arctic Council delegates listen more than they speak, galvanized participants for moving forward with a stronger sense of purpose. The participants' final Communication Action Plans reflected their intense focus, commitment to collaboration and inclusion of Indigenous voices and perspectives, and acute attention to word choice. Our observation of students' appreciation of experts' involvement mirrors Jaleniauskiene's (2016, 270) finding that co-participation and interaction with experts provides learning opportunities to construct knowledge rather than discover or receive knowledge.

One student wrote on our survey: "We got to interact with people like Ed Alexander and Ann Meceda who have firsthand experience within Arctic Council meetings; the access we had to them ... to ask questions and learn from them is something that would not so naturally happen in a traditional classroom setting." In the debriefing, students echoed Alexander's words of advice: "You don't even know how powerful you are." One participant praised Ann Meceda's involvement, both her willingness to listen to the students and her taking the program seriously: "I really enjoy that we're getting our voices heard, because we are the ones who are ... taking on the mantle in the future."

Our quantitative data support the four themes derived from the qualitative data. Levels of agreement with statements relating to these themes averaged between 4 (*agree*) and 5 (*strongly agree*). See Table 3.

We conclude that the multiple methods of teaching within the program led to student perceptions of enhanced learning outcomes. Introductory lectures and orientation exercises set the scene and began to build trust, priming the students for an engaging, interactive program. Inspiring messages from Cameroonian leader Kah Walla and Gwich'in

Council International Co-Chair Edward Alexander fostered students' faith in their own agency and efficacy, while encouraging commitment to civic engagement. The negotiation workshop prepared students for consensus-style negotiating during the MAC simulation. Mentoring from organizers and Arctic Council practitioners during the simulation assisted students in negotiating effectively and achieving consensus. Students found the performance requirements of the simulation both daunting and exhilarating. The process of moving their multitude of pressing climate challenges in the region toward concise, coherent Communication Action Plans proved enlightening. Several students explicitly credited the interdisciplinarity of the participants and organizers with their success. Many expressed wonder at the synergy they had achieved and newfound appreciation of the policymaking process. Finally, the contributions of Arctic Council practitioners in the process—their presence, guidance and mentoring, and endorsement of the program itself—lent legitimacy and authenticity to the program, heightening student experience and learning outcomes.

Conclusion and recommendations

The challenges facing the Arctic today, including local to global implications of climate change, require educating young people on these threats and opportunities and preparing them for leadership roles in the region. The Model Arctic Council (MAC) program's multimodal, interactive, and interdisciplinary methods engage students actively as they teach about the Arctic and the Arctic Council. Moreover, our research data suggest that the simulation and auxiliary lectures and exercises fostered leadership and diplomacy skills in participants and inspired them to engage in civic activity. The participation of leading experts in Arctic science and policy, as well as Arctic Council practitioners and other policymakers, offers students benefits associated with highly impactful experiential learning. Students identified numerous aspects of the program that they felt surpassed the conventional classroom experience, including the performance requirement of the simulation, interaction with experts, and networking with other students and professionals focused on the Arctic. The program's permanent structure, with biennial international MACs held in the Arctic state chairing the Arctic Council, and regional MACs held between those events, ensures continuity and fosters the building of a cadre of professionals prepared to assume leadership roles in the Arctic.

Based on participant feedback, we encourage educators to consider adopting simulation pedagogy, in combination with other methods, to provide students opportunities to wrestle with pressing public concerns. The strengths of the mixed-method approach apply equally well to a wide array of topics and international institutions. The performance aspect of the simulation requires students to take responsibility for the curriculum and internalize their roles, a process that leads to much deeper understanding of the issues at hand than students typically achieve in the traditional classroom setting. We recommend a preliminary session on institutional protocols, to prepare students for the simulation. We urge striving for authenticity, while remaining open to occasional outtakes for teaching moments. Surrounding the simulation itself with a complement of interactive exercises and lectures by experts, especially practitioners, maintains student

interest, affirms a variety of learning styles and fosters strong simulation performances. Finally, we favor interdisciplinarity among program leaders and students, as it permits tackling challenges holistically, from a multitude of perspectives, which contributes to optimized learning outcomes and more effective and lasting solutions.

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Notes

1. The eight Arctic Council Member States are Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States. The six Arctic Council Permanent Participants are the Aleut International Association (AIA), Arctic Athabaskan Council (AAC), Gwich'in Council International (GCI), Inuit Circumpolar Council (ICC), Russian Association of Indigenous Peoples of the North (RAIPON), and Saami Council (SC).
2. The six Arctic Council Working Groups are the Arctic Contaminants Action Program (ACAP); Arctic Monitoring and Assessment Program (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency Prevention, Preparedness and Response (EPPR); Protection of the Arctic Marine Environment (PAME); and Sustainable Development Working Group (SDWG).
3. The latter two agreements have not been ratified by all Member States and thus have not yet entered into force.
4. Students do not earn academic credit for their participation in the program, although we provide certificates of completion.
5. These included anthropology, Arctic studies, biology, business management, ecology, economics, education, engineering, environmental science, geography, glaciology, health studies, history, Indigenous studies, international relations, law, oceanography, physics, political science, psychology, public policy, and sustainable development.
6. Students' universities included Carleton University, Dartmouth College, Durham University, McMaster University, Memorial University of Newfoundland, Queen's University, Trent University, United States Coast Guard Academy, University of Alaska Anchorage, University of Alaska Fairbanks, University of Northern British Columbia, University of Tübingen, University of Washington, and Yale University. Two students came to the program through a separate international collaboration between Dartmouth College and their universities.
7. We wish to acknowledge Joshua Glasser of the U.S. State Department for his guidance in selecting this emphasis.
8. Two of the 25 participants had to leave the program early and thus were not able to complete the survey.
9. Unless otherwise noted, the Likert scale ranges from 1 (*strongly disagree*) to 5 (*strongly agree*).

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