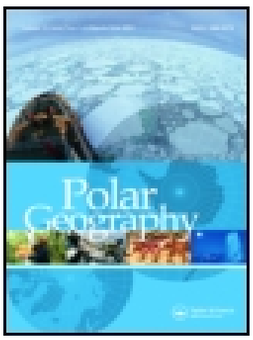

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# Scenarios development with Alaska's Arctic Indigenous youth: perceptions of healthy sustainable futures in the Northwest Arctic Borough

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**ABSTRACT**

How do arctic youth perceive the resilience of their communities? Many of today's high school students in Arctic Alaska will takeup leadership roles in their communities in the next decade. The social-environmental changes these communities face are disruptive andpose challenges to local governance now and into the future. Arctic Futures Makers (AFM) was a scenarios workshop of 22 Alaska Indigenoushigh school students convened over two days in February 2016 on the resilience of the Northwest Arctic Borough's communities in light ofclimate and development changes. The scope of the scenarios workshop focused on defining factors the students felt were key to the futureof healthy and sustainable communities. The intent was to understand how potential leaders perceived the futures of their communities andtheir own role in the changing dynamics of the Arctic. Three findings are significant to explain how these youth think about themselves andtheir region's future: (1) high school students' results are similar to those of adults in similar workshops but with important differencesrelated to what makes a community 'livable' (2) students were initially reticent to imagine multiple possible futures (3) students' perceptionsof their own communities' resilience changed after the workshop experience.

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Arctic; Indigenous; youth; education: scenarios; resilience; futures; global warming; adaptation

## Introduction

This paper reports findings of a social learning pilot project for high school students in the Northwest Arctic Borough (NAB) in February 2016. The pilot project was designed to bring scenarios and futures thinking methodologies into the discussion of the transforming nature of the region from climate disruption, cultural changes, and economic development. The project was funded by the Northwest Arctic Borough Science Commission to engage young people in the governance of the region. Across the circumpolar North and in Alaska's Arctic the number of young people as a percentage of the population is above the national norm. The percentage of Indigenous youth is relatively high and their path to adult-hood can often be complex and difficult (Wexler et al., 2013). Table 1 demonstrates the key facts for the choice of NAB as a location to engage Arctic youth in a scenarios workshop. This region's population is relatively young, less Western/colonial school-educated than in the

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North Slope Borough (NSB), the state of AK as a whole, and the US. In addition, the Arctic region of the state, the scale at which the data was collected, includes NAB and NSB, and has the highest levels of subsistence reliance throughout the state. In sum, the youth in the NAB are more tightly tied to their environment and more likely to be decision-makers in their region as they age, but often with little education beyond their high school completion. We focus our project here because the NSB, due to the influx of capital in the last 50 years related to extractive industries resembles the metrics of the state and nation more closely. In the NAB learning in K-12 and other learning through Indigenous enculturation we posit is more crucial to the development of pertinent place-based leadership skills than other external forces or university degrees (Figure 1).

Due to these circumstances, high school is an important location of technical and social learning for young people who are likely to take on leadership roles in their communities at some point after graduation. Our project sought to learn from local youth, in our case Indigenous high school students from across the NAB, what they felt were the most important key factors for their communities' health and sustainability – resilience – in the decades to come. We sought to understand how students would engage the concept of futures thinking. In what ways did they know their own social-ecological system as well as the trajectory of the

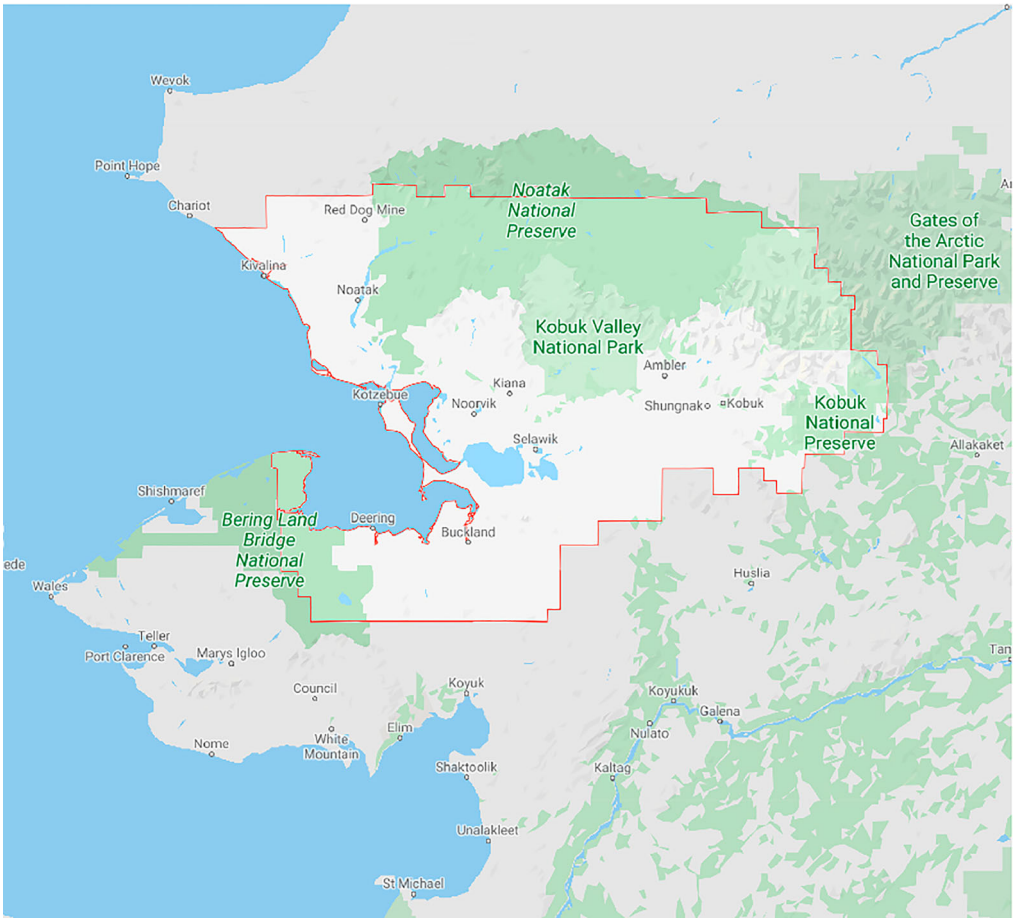


**Figure 1.** Map of the Northwest Arctic Borough in Alaska, USA.

**Table 1.** Age, education, and subsistence in Arctic Alaska.

| | NAB | NSB | U.S. average | AK average |
|---|---|---|---|---|
| Median Age | 26.6[a] | 34.6[b] | 38 | 33.4 |
| % youth under 18 | 35.7%; 45% of population is under 45 years old[d] | 26.2 | 22.6% | 25% |
| % population Indigenous | 81.6[a] | 50.9%[b] | 1.3% | 24% |
| 25 y.o.[c] HS completion or equivalent 2013–2017 (5 year average) | 80.7% | 88.4% | 87.3% | 92.4 |
| 25 y.o.[c] BA or higher completion 2013–2017 | 10.8% | 15.3% | 30.9% | 29% |
| Subsistence Practices | Arctic region of Alaska harvesting game 63%, using 92%; fishing 78%, using 96%[e] | Arctic region of Alaska harvesting game 63%, using 92%; fishing 78%, using 96%[e] | No comparison | Approximately 83% of Alaska's total population live in nonsubsistence areas (urban locations)[e] |

All facts from the US census directly unless otherwise indicated.
https://www.census.gov/quickfacts/fact/table/northwestarcticboroughalaska/PST045218
[a]https://datausa.io/profile/geo/northwest-arctic-borough-ak/#about
[b]https://datausa.io/profile/geo/north-slope-borough-ak
[c]http://www.north-slope.org/assets/images/uploads/NSB_Economic_Profile_and_Census_Report_2015_FINAL.pdf
[d]Alaska Population Overview http://live.laborstats.alaska.gov/pop/popestpub.cfm
[e]Fall (2014).

changes taking place? As individuals, what would be their understanding of their own community's resilience? These thoughts became the key questions leading to the three hypotheses. The overarching question we sought to address: how do high school students in Arctic Alaska understand the possibilities of resilience for their Arctic communities?

Our hypotheses were as follows:

- H1: Youth (the high school students) would be more imaginative than their adult counterparts in their contemplation of the future.
- H2: Based on their lived experiences, their key factors would differ significantly from key factors previously identified by adults in Arctic Alaska.
- H3: Students would leave the workshop empowered by their deliberations and respond as such in the post-workshop survey.

## The environmental context of rapid Arctic change

While the earth is generally warming, the rates at the poles are much faster than mid-latitudes and Arctic scientists often prefer to discuss 'climate change' as a suite of factors rather than unidirectional rise in temperature because changing temperatures are only one part of the earth system flux occurring due to significant greenhouse gas additions to the earth's atmosphere over the last century (Solomon et al., 2009). In the Arctic, the nature of the Earth's cryosphere – a word stemming from the Greek word 'kryos' referring to cold or frost – is of paramount importance to all life. Over time plants, animals, and societies have evolved and adapted to the annual cycle of freeze, melt, and thaw that now faces disruption. In modern usage, the cryosphere refers to all locations on the planet where water is in its solid form either above ground as freshwater ice or sea ice, glaciers, and snow, or below ground as permafrost.

The National Snow and Ice Data Center has reported that 2019 now joins 2007, 2012, 2016, and 2011 as the five lowest maximum summer sea ice extents on record, with every year since 2010 in the top 13 since satellite records began in 1979 (NSIDC, 2019). In brief, the most recent NOAA Arctic Report Card (Richter-Menge et al., 2019) indicates that the average surface air temperature above latitude 60N, for the year ending in August 2019, was the second warmest since 1900 – with all years since 2014 exceeding previous records. The 2018 NOAA report (Osborne et al., 2018) stated that the 'Arctic shows no signs of returning to reliably frozen region of recent past decades' and it calls this

> a new normal characterized by long-term losses in the extent and thickness of the sea ice cover, the extent and duration of the winter snow cover and the mass of ice in the Greenland Ice Sheet and Arctic glaciers, and warming sea surface and permafrost temperatures.

In early March 2017, satellites observed the sea ice cover to be relatively young and thin with multiyear ice (more than 1 year old) comprising only 21% of ice cover in 2017 compared to 45% in 1985. The August 2019 sea surface temperatures in the Barents and Chukchi Seas were up to 1–7°C warmer than average, which contributed to a delay in the autumn freeze-up in these regions. Recent data on sea ice extent indicates that 50% of the summer sea ice extent and 60% of its volume have disappeared in the last several decades (Meier et al., 2014).

Inside the Earth, permafrost is thawing with new record high mean annual ground temperatures observed at many permafrost observation stations across the Arctic and near the surface the 'active layer', where permafrost thaws and freezes seasonally, is freezing up

two months later than usual (Romanovsky et al., 2017). Boreal forest wildfire activity has increased both in the boreal forest and on arctic tundra, and wildfire risks are only projected to increase due to warmer, drier conditions in the North (French et al., 2015). The U.S. Global Change Research Program's most recent Climate Science Special Report also indicates significant decreases in snow cover extent across the Northern Hemisphere and that the annual average of Arctic-wide ice mass from glaciers continues to decrease every year since 1984 (USGCRP, 2017). These environmental changes exceed the scope of intergenerational Arctic Indigenous knowledge. They directly affect the social lives of people in the Arctic in particular for those communities relying on subsistence, not only for food but also enculturation. Indigenous Elders from the Bering Sea communities note

> [i]n a warming Arctic access to our subsistence foods is shrinking and becoming more hazardous to hunt and fish. At the same time, thawing permafrost and more frequent and higher storm surges increasingly threaten our homes, schools, airports, and utilities. (Richter-Menge et al., 2019)

This context of change disrupts the transmission of Indigenous Knowledge and also creates uncertainty of livelihoods and the future across age groups. But, given that all subsistence-based Arctic communities will feel these effects, why a focus on those who are young? Because, as noted above, if resilience – the maintenance of what is valued in a community by adjusting to changing conditions, rather than working only for a single stable state of existence – matters, then young people need adaptive capacity to become adults able to create resilient communities. Adaptive capacity in a person or community is relative and dynamic, it must be supported by social and environmental resources (Adger, 2000; Adger et al., 2005; Plummer & Armitage, 2010; Walker et al., 2006). To understand what might foster this, we have to think of youth as being experts.

## The role of youth in community resilience

Australian Peter Kelly has been writing about youth and youth studies for over a decade and is worth quoting at length to express our orientation towards 'youth studies' and the importance of engaging and researching with young people in the Arctic.

> As an artefact of expertise, youth is principally about becoming: becoming an adult, becoming a citizen, becoming independent, becoming autonomous, becoming mature and becoming responsible. There is some sense in which all constructions of youth defer to this narrative of becoming, of transition. Moreover, there is a sense in which becoming automatically invokes the future. Youth, as it is constructed in at-risk discourses, is at risk of jeopardising, through present behaviours and dispositions, desired futures. This sort of probabilistic thinking attempts to construct a series of causal relationships between these different configurations of time and space. These possible futures, as additional artefacts of the activities of expertise, are fundamentally normative. There is a strong sense that there are preferred futures awaiting these populations in transition. (Kelly, 2011, p. 49)

Kelly's work highlights three key aspects of our research. First, we justify our project by considering youth as a unit of analysis worthy of study due to their collective, age- and experience-based attribute of 'becoming'. Second, youth have a long future in front of them that they may or may not think about, and that they may or may not have strong feelings about in relation to outcomes. However, adults think about young people and often have strong normative constructions in their minds of what young people should be and do. While it is beyond the scope of this paper, the long history of assimilating or diminishing

the identities of Indigenous youth through 'at-risk' or 'deficit' discourses (Dhillon, 2017) creates compelling justification for a project that talks with Indigenous youth themselves. We sought to engage and learn from them directly in this project, though, as noted we worked with students that communities felt should be at the workshop, so we had no way determining the 'type' of students. Third, youth experience governments and governance (Cost, 2015) differently than adults because both their State of Alaska and Indigenous cultural schooling are informed by societal demands expressed through techniques of governance (e.g. classroom seating, number of hours in school, subjects taught, perspectives encouraged and discouraged). Building on points one and two, it was this suite of experiences we sought to research in order to learn how they perceived health and sustainability in their communities.

### *Three approaches to youth in studies of them (the youth themselves)*

What are youth studies? And why, as Kelly notes above, are youth an 'artifact', a 'class', to be studied at all? There is debate over this even among youth studies scholars, who frequently cite three main aspects of high school and college-age young people that make them unique topics of study. First, the *transitional approach*, as noted by Kelly (2000, 2003, 2011), Evans and Furlong (1997), Henderson et al. (2007), and Furlong (2012), is tied to the 'invention' of adulthood by people who are not yet at that stage. Society anticipates that children and young adults will transition into adulthood, creating pathways for themselves based on schooling, economic, societal, and cultural choices. One reason to study such a group is to understand how young people make these choices, and what facilitates positive (adaptive) choices compared to negative (maladaptive) ones. This is an important aspect of the lives of young people in the rural Arctic and relates to resilience-thinking; the ability to feel a degree of fate control over the outcomes of one's self and community (H3).

Indigenous youth in these regions (and also non-Indigenous youth to an extent) often have two, sometimes competing, transitional forces pressing on them: the 'white', 'Western', 'capitalist' mode and the 'Indigenous', 'rural/Native', 'subsistence' mode. In the NAB this also relates to language and place-based identity. These forces matter because as the region undergoes complex and rapid changes, so too does its youth. But, because of their strong ties to landscape change in terms of food provision or livelihood, the transition of these NAB youth into adulthood may strongly impact the fate of both their culture and community in their hands. These youth will have to decide on staying local or going away for further training or college with the possibility of not returning or returning to a much-changed environmental state. Their Iñupiaq culture, language and skills will be impacted for their generation and the next. Anticipatory governance rooted in early learning experiences will mitigate some of these negative impacts and provide more fluid pathways for more and more mobile generation. In villages of fewer than 1000 people, the future leadership of today's high school students can have a profound impact. In our research with them we wanted to understand how imaginative they were in relation to their possible futures, to know the scope of their thinking about trajectories for the NWAB that may be adaptive or maladaptive (H1). In addition, we wanted to understand how they viewed the attributes of resilient communities from a group perspective, and whether there was a generation gap between them and the adults we worked with previously (H2).

The three hypotheses also relate to the second major thread of youth studies, the *cultural approach*. Through this approach, authors define youth as a class because young people share

cultural similarities with one another based on age. Initially focused on how young people have been resisters of trends or events in society (Hall & Jefferson, 1993), this concept has expanded over the years to broadly discuss what youth *do*: leisure activities, subcultures, lifestyle choices, consumption patterns and deviance have all become subjects of study to scholars seeking to delineate a 'youth identity' (Abbott-Chapman & Robertson, 2009; Best, 2009; Furlong, 2012; Miles, 2000; Waiton, 2001). The 21 participants in our study were all Indigenous. This was a benefit in terms of being able to explore similarities and differences in young people who share a similar culture-within-a-culture identity. It could also be considered a drawback because we had no 'white' or other ethnicities as a control. This paper makes the case that their thoughts, feelings and capacity to consider their own futures constitute individual resilience that also supports their communities. We did also collect data in this project at the individual scale to understand protective factors that help young people to be resilient, but to include those results here is beyond the scope of this paper.

In addition to these established approaches, we also explore a relatively new perspective on youth that asks what they might have to offer in terms of policy. We simply call this the *policy approach* and make note of it because the project indirectly addresses it. Note that Arctic Futures Makers (AFM) was a pilot project designed to determine if participatory scenarios with youth had value for them, but also whether it could apply to the future of policy in the region as a social learning exercise. The promise of Arctic youth to actively shape the future remains an untapped resource in the pursuit of community resilience. Lebel et al. (2010) have outlined six ways that social learning processes, such as scenarios development, are potentially important for building adaptive capacity. Our research is based on the concept that engaging and empowering young people in thinking, deliberating, and planning for futures develops a foundation for effective community leadership later in their lives. This third line of youth studies argues that 'when youth are engaged, particularly when empowerment and development opportunities are provided, there are multiple benefits for society' (Ho et al., 2015, p. 52; Maconachie, 2014; Powers & Tiffany, 2006). Powers and Tiffany (2006) also note that asking youth to generate knowledge related to important aspects of adult decision-making broadens their skill sets. In one of the very few published articles about youth and future society, Novaky and Varnagy (2013) describe results from a project called 'Hungary 2025' in which surveys were administered to 980 18-year-olds through a representative sample of secondary schools in Hungary. While their results are not wholly comparable to a small workshop setting, some of the trends they noted apply to observed AFM trends. Four similarities were: (1) technocratic optimism that people will innovate their way out of current problems to improve their life; (2) a focus beyond the self to one's community and consideration of disadvantaged groups; (3) not imagining the future to be that much different from the present ('avoiding extremities' even when faced by questions about global warming); and (4) a degree of fear (Novaky & Varnagy, 2013, p. S53). Our data results cannot draw explicit policy preferences, except in one case related to firearms we discuss below, but we have found enough information from our workshop to pursue this approach in more detail as we develop other projects.

## Indigenous youth

One cannot engage in youth studies, in particular studies of youth who are marginalized due to age, gender, sexual orientation, race, or ethnicity, without looking at the reverse of what is discussed above: what do policy and governance *do* to young people? In other words,

mistrust of youth can become institutionalized in forms of surveillance and suspicion (Kelly, 2003), and for Indigenous youth this mistrust can become the norm in 'contemporary settler colonial institutions, discourses, and policies' (Dhillon, 2017, p. xi). Kelly (2005, p. 1) argues that the anxiety adults face in relation to young people is hardly new, and that young people are considered to occupy a zone 'as imagined within the institutional spaces characteristic of modernity' where 'certain young people have been viewed as being "ungovernable" and lacking in "self-regulation"'. These representations have always been fundamentally shaped by race, class and gender and situated in relation to particular ideas about '"normal" youth'. Dhillon (2017) makes the case in her book *Prairie Rising*, focused on Indigenous youth in urban Saskatchewan, that Canada's programmatic focus on an 'Indigenous Youth Crisis' engages state and community actors to create a disabling narrative. Although the focus purports inclusion and participation by Indigenous youth, it does not account for the complexity of the governing institutions that press on their lives. Dhillon's ethnographic study examines how social control over the minds and bodies of Indigenous youth combined through intertwined systems of education, child welfare, and criminal justice create a devastating deficit approach to governing these young people. She takes the view that the 'politics of recognition' accorded Indigenous people in Canada actually limits self-determination by reflecting settler colonial concepts of who and what is recognized (also reflected in Coulthard, 2014, p. 3). Additionally, the politics of inclusion that result from recognition create a push by established national and regional governments for Indigenous peoples to participate 'in the development of programs and policies affecting their communities'.

> But, participation does not exist in a neutral, suspended space, empty of power and history, nor are its benefits necessarily axiomatic or its implications readily predictable … participation, as an instantiation of contemporary inclusionary governance, is fundamentally a reassertion of asymmetrical power relations, albeit in a new guise, because the terms and form of political engagement are mediated by a settler-nation-state that has been created through colonial dominance. (Dhillon, 2017, p. 14)

No population is perhaps more vulnerable to this than youth:

> Governance impacts Indigenous youth acutely, and holistically, immediately and in the long term, for theirs is a future still in the making, a future that will be marked by ongoing settler self-articulation and the concomitant realities of an Indigenous resurgence that takes many shapes across many spaces. (Dhillon, 2017, p. 9)

Throughout the design and implementation of the study, we have wrestled with trying to provide a social learning process for young people in the NAB without limiting Indigenous youth to colonial or settler expectations of their future. Our goal for Arctic Futures Makers had been to find a way to encourage high school students to imagine, fantasize, evaluate, consider, and deliberate as many possible futures as they consider meaningful, including the destruction of current forms of governing to be replaced by Indigenous governing systems (Wexler, 2014; Wexler et al., 2009). We strongly argue that social learning cannot limit the imagination or reduce concepts like self-determination to *desirable but impossible*. As facilitators we took great lengths to ensure we encouraged multiple standpoints and outcomes. Participatory scenarios are 'what if' exercises inclusive of all forms of knowledge and thinking, even if they are unpalatable to some members of the group, stopping short of proposed violence or conclusions based on false information.

## Arctic futures makers

Indigenous youth will have a major impact in determining the resilience of NAB communities into the future. They hold the potential to develop adaptive capacity from their transitional point in the social system. The youth are future policy makers and frequent users of ecosystems and social services. Because youth are in the initial phases of seeking, testing, and proving their own self-regulation, they can also begin to explore ways to diversify their own resilience portfolios. Young people are initiating their journey toward developing adaptations to living successfully. For communities to survive and thrive, valuing buy-in by youth has the potential to engage them in their communities at an early age (Brown & Henkin, 2014; Dougherty, 2004). Treating youth as involved and responsible citizens at a time when other community members might peremptorily label them as disengaged has the potential to flip the script. Blackwell et al. (2007) and others have found that children reshape their brains while learning and practicing skills, which in turn motivates them to achieve once this learning and practice are made explicit and reflective. Our hypotheses support the idea that given the opportunity and engaged in authentic critical thinking exercises, youth considering their futures will continue to revisit this thought process to refine, tune and adapt their thinking to positively impact their pathways to various futures.

Just as the elders gather and contribute important knowledge and lessons from Indigenous culture engaged and lived experience richly, if youth are to arrive in the future with similar or greater capacities, the key is to include them in decisions early and often. Lacking the structures of job title or community position, youth in the community have increased freedom to *think* outside the box, though their behaviors may be regulated. Students can often generate novel ideas and approaches that stretch the boundaries of social learning and open up the imagination and conversation of a group. Mistakes are part of growing up, and hence allow students to venture guesses and make attempts that provide the necessary ingredients to develop a richer narrative of the pathway to an identified future. This narrative in turn leads to a more robust set of adaptation strategies to be considered along the way.

### *Participant demographics*

Ten NWAB students from the villages outside of Kotzebue flew into Kotzebue and were joined for the workshop by 11 students who attended Kotzebue High School. Twenty-one students took the pre-workshop survey and 19 students took the post-workshop survey; one student dropped out at the beginning of day one and another chose not to complete the post-survey. As per demographic data from survey question 1–6: villages represented were Ambler, Buckland, Deering, Kiana, Kivalina, Noatak, Noorvik, Selawik, Shungnak. Students were in grades 10–12 and ranged in age from 16 to 18 years old. Of the 21 pre-survey participants, 33% were male (7), and 66% female (14). All students identified as Alaska Native and Iñupiat. It was important that the workshop was creative and engaging while allowing us to collect data. We created multiple alternative assessment forms to check for understanding and triangulate validity of results. We wanted to keep the guiding concepts of scenarios development fairly simple. We used only four essential steps for developing scenarios.

*Step 1. Review past events and discuss current knowledge.* What major events from participants' memories in the past and present have had an impact on the focus question? In other scenarios development workshop projects, we produced briefing books to support this step.

We used some of this data, but it proved more impactful to think about and discuss what the students generated.

*Step 2. Identify forces, factors, trends and important drivers that have an impact on the focal question.*

*Step 3. Identify critical uncertainties.* Based on step two, where did gaps in knowledge exist and/or where are there areas of concern that there is great uncertainty? (e.g. climate change and its resulting impact on sea ice).

*Step 4. Develop scenario characteristics and tell stories about them to link today to tomorrow.* Here we choose two of the key drivers that participants hypothesize will be most impactful on the focus question. Then we chart them on a *x*- and *y*-axis high to low and tell the four stories of the pathways to the possible futures, incorporating the other forces, factors, trends and drivers when and where possible.

Based on these four steps, we developed an agenda that addressed two steps per day.

## Methodology

In Spring 2015 the research team received a grant from the NAB Science Steering Committee to develop and facilitate Arctic Futures Makers, an extension of our larger National Science Foundation Northern Alaska Scenarios Project (NASP) (Lovecraft et al., 2017) project engaging residents of the North Slope Borough and the Northwest Arctic Borough. We partnered with the NAB school district to hold a two-day scenarios workshop with students from across the borough to address 'What does the Northwest Arctic Borough need to have healthy and sustainable communities in 2040?' We anticipated that students would use their knowledge about climate changes, subsistence, cultural practices, local policies, trends, and the people of their region to imaginatively discuss what their home might look like in a few decades. The overarching goal was to create a sense of connection between Indigenous Knowledge, high school learning, and 'real-world' decision-making (i.e. participation in borough planning, subsistence policymaking, search and rescue organization). The research goal was to understand the priorities of Arctic Indigenous youth in relation to health and sustainability, a proxy for resilience, because youth are an often overlooked but vital link to maintaining and revitalizing cultural, economic, and social knowledge. In addition, we would compare the outcomes between the high school project and our earlier NASP work as well as future scenario-based projects related to Arctic community resilience. Specific twin goals for the students were (1) for them to develop a sense of what they want for themselves and their communities by 2040 and (2) begin making plans to reach those targets while thinking across multiple aspects of their social-environmental systems.

Because young people will inherit our problems and progress, we presented an opportunity for them to display their 'youth knowledge' related to Kelly's 'becoming' given their own context (2011). By participating in this workshop, we hoped they would better understand what they have learned, what they know, and to develop a sense of ownership over their future in Arctic Alaska. A major priority in workshop design was to determine what had been working for the Northwest Arctic Borough School District (NWABSD) and how this research project could dovetail with what students were already learning and doing. In planning for the Arctic Futures Makers workshop, we worked with the NWABSD Assistant Superintendent Ralph King and Head of Counseling Services Tony Jones. We discussed how this might be facilitated, logistics, and recruitment of interested high school students. At the suggestion of the Assistant Superintendent, we chose participants who were part of

the Northwest Arctic Leadership Team (NWALT), a youth organization with a representative at each school. NWALT is a borough-wide group of students composed of 2–3 school leaders per school who were identified by their peers. In 2040, the year anchoring AFM's focal question, these students will be in their early forties, a time when they are likely to have become opinion-leaders and decision-makers in their communities. Their perspectives in the *now* provide valuable insight into possible paths and futures for the community, and more importantly, some expectations they have of their future communities. We also decided to offer the workshop as a one-credit seminar class at UAF to offer the students the chance to learn about futures studies while building a bridge to one of their possible futures as a student in a university system.

### *Day 1 of AFM scenarios workshop – learning how to 'what if … '*

We used a classroom at the Alaska Technical Center in Kotzebue to assemble the students for the workshop. We also had breakout spaces, which proved useful especially during group work and deliberations. We began with breakfast and followed that up with the pre-workshop survey (see appendix) to establish a baseline of data from students about how they thought about futures, community, schooling and learning, and opportunities and obstacles. The data pertinent to this paper is analyzed more closely in the results section below.

We then covered the logistics of the location, who we were, and expectations for the workshop and answered any questions the students had for us. It was important for us at this point to link this workshop with our larger project, the Northern Alaska Scenarios Project (NASP). We wanted to do this for two reasons. Firstly, it connected the students to a larger group of people who were collaborating with us on the larger-scale, two-borough project, and it secondly, gave us the opportunity to have an elder from their community who had worked with us come in and share his experiences, knowledge, and perceptions of the rapid change he had witnessed over the last 25 years; the same length of time being considered via the workshop's focal question. Fred Smith, an Iñupiat man and longtime community member who participated in two NASP workshops and had lived in the region since birth, spoke about his role in NASP and why the students had been invited to a similar enterprise. He introduced our research team and he was careful not to discuss the results of NASP. As facilitators, we then laid out our goals and what the students could expect as new knowledge they could take home by the end. After explaining scenarios development processes and relevant terms to the group, and then gave them their focal question, 'What is needed for healthy sustainable communities in the Northwest Arctic Borough by 2040?' On easel boards the students wrote ideas and terms to describe what a healthy community that was sustainable (i.e. resilient) in the NAB would look like. When thinking about the future, it became clear the student's difficulty separating the concepts of *what could happen* from *what I would like to happen* and from *what they felt was likely to happen* than the adults we worked with. To separate these, we had two tactics we invoked throughout the workshop. One was to close their eyes, imagine themselves at 40 years of age, and play with the idea of who they would be. What would they be doing? We used the humor often present in the room to propose outlandish ideas as well as mundane possibilities. Secondly, we often discussed the project as a journey. These young people were fully knowledgeable about the preparation and risks involved in a hundred mile or more snow-machine journey for hunting or visiting. We worked to talk about futures-thinking in modes relevant to their experiences (Table 2).

Once the first few contributions were recorded, these kinds of activities began to calm nerves and the students came up with many ideas when thinking about the nature of their future communities. By the middle of the first day the students began to take over ownership in the scenarios process and verbalized their knowledge, thoughtfulness, and insight when envisioning the future of their communities. We highly suspect from conversations with them that once they realized we weren't hunting around for 'correct' answers but really wanted to know what they thought this broke the ice. After lunch we started in on Step 2 in the scenarios development methodology, the understanding of current data. We moved

**Table 2.** Phrases for visions of future communities by participants.

| | |
|---|---|
| No drugs and alcohol | Friendships |
| Culture | More scholarships |
| No domestic violence | Technology |
| Values | Museums |
| Volleyball | Food |
| Eskimo games | Colleges – school close to home |
| Eskimo dancing | Doctors in community |
| The right to bear arms | Welding – vocation education/training |
| Subsistence life – FF ES | Engineering |
| Be content with what you have | Markets |
| Patience | Good health care – hospital jobs, opportunities |
| People who aren't selfish | More windmills FF |
| Adaptation | Hydroelectric FF |
| Education | Solar power FF |
| New schools | Growing food – farms ES |
| Relocate | Caribou ES |
| Wood stove | More local people making decisions |
| Outdoor games – FF ES | Colder winters-more snow ES |
| Knowledge of family tree | Peace |
| Knowledge of language | Communication-face-to-face could be events |
| Respect for elders | Cooperation |
| Subsistence hunting FF ES | Respect |
| Solar energy FF | Faith in God |
| Beaches | Snow machines activities ES FF |
| Fresh berries | Love |
| Flowers | Positive |
| Transportation FF ES | Basketball |
| Virtual reality | Interaction |
| Clean water ES | Art |
| Places to play | Writing novels |
| Beautiful land-aesthetics ES | Careers |
| Hovercraft FF | Reading |
| Artificial intelligence | Having free time |
| Time travel | Success |
| Humor | Hard work |
| Companies-money $-jobs at home FF ES | Talents |
| Family | Positive interaction |
| Freedom- free to do what you want without harming anyone else | Water parks |
| Clean environment ES | More resources |
| Fishing | Safe environment |
| Camping | Clean air |
| Clean water | Communication among local and federal government |
| Lower prices for healthy foods FF | Shops |
| Culture | Strong churches and faith |
| Love for children | Traditions |
| Music | Music |
| Good paying jobs FF ES | Contentment |
| Stove oil FF | Restaurants |
| Respect for nature | Strong military – Navy SEAL |
| Respect for others | Fishing |
| Sea ice | Alternative energy |

FF – Fossil Fuels related, ES – Environmental Stewardship related.

students toward understanding the concept of ecological and societal drivers and their role in social-ecological system (SES). It became clear that, for a shorter workshop such as Arctic Futures Makers, one key is to identify methods to bridge the copious amounts of data that create the present and near future. Students were asked to use their research and referencing skills in materials we had brought to locate 10 elements of their SES related to visions they had generated for their Year 2040 communities; a data scavenger hunt. In particular, we pressed the importance of incorporating useful data into the narratives, whether it was observational, Indigenous Knowledge-based, or Western Science-based.

Next, in four groups of 4–5 students they were asked to identify forces, factors, and trends that would have an impact on the focal question, 'what is needed for healthy sustainable communities by the year 2040?' After students reported on the highlights of their small-group discussions, we asked, 'What is it in the world that is going to make changes in these topics?' Each of the four groups took on one of the four aspects students identified as key to the healthy sustainable community of their future. The topics they selected were (1) arts, (2) economic activity, (3) environment, and (4) food. Students then recapped their discussions in a plenary setting with their colleagues in conjunction with their large Post-It note easel pads (Table 3).

The point was to identify the causal relationships across scales of the aspects important to community sustainability. At this point in the day, participants were becoming more skilled in identifying the relationships between key factors and important qualities of a community, so we moved to narrow the list of key factors students wanted to include in the scenarios exercises. Descriptors of qualities of the future community were ordered into like sectors by the research team for voting by the students. As a group, the students brainstormed a list of drivers (the key factors) that might impact the list of desired qualities of future NAB communities. The following are the key drivers that students identified and collated

**Table 3.** Key factors for four components of healthy sustainable communities.

| | Food | Economic activity | Environment | Arts |
|---|---|---|---|---|
| Definitional concepts | Growing food – farms, Caribou, Subsistence activities-hunt/fish/gather, Lower prices for healthy foods, Fishing | Companies – jobs at home, Good paying jobs, Markets for goods, Lower prices for goods, More resources, Shops and restaurants | Clean water, Clean environment, Colder winters – 'normal weather', Sea ice | Art, Writing novels, careers – reading, Music, Museums |
| Key Factors (drivers of change, positive or negative) | More animals- species health could be more or less; More resources for market food; Clean water for healthy food – rivers and sea as healthy habitat for fish; More greenhouse = more food; Less money to ship food; Food for animals; Monitoring of animal population, taking care of them; Sick animals – overhunting; Oil spills-environmental disaster; Mine roads – caribou migration patterns; Industries moving in | Growth in population; Supply and demand for products; Money; Will to work; More than enough resources – if you have excess people will pay for it; Government | Alternative energy – having more might remove dependence on diesel; More animals; Good management – Things are safe; More pollution – that come from far away, that can come from a lot of places; Natural disasters; Government's management of the environment | The economy – more people buying in a good economy; whether there is a war going on or not; whether or not people are talented; number of artists; knowledge of language; availability of materials |

themselves with minimal help from us. They identified patterns and created organization that reflected their perceptions of the subjects (Table 4).

Two of the three facilitators had participated in the NASP project and it was compelling to note that the students' drivers looked remarkably similar to the list that adult participants created.

Students then voted by placing dots to prioritize (1) which drivers would be most important, and (2) which drivers they knew least about (i.e. what seemed the most uncertain). Table 5 reflects the Key Factors that received the most votes.

The key factors that students generated were less technical but mirrored many of the key factors generated by their adult counterparts (from across the Northwest Arctic Borough and the North Slope Borough) generated during the Northern Alaska Scenarios Project (Table 6).

**Table 4.** Arctic Futures Makers (AFM) key factors sorted with participants.

| | |
|---|---|
| **Energy** | **Values** |
| Alternative | Culture – Iñupiaq Values |
| More windmills | Humor |
| Solar power | Freedom |
| Woodstove/Stove oil | Respect for elders |
| | Knowledge of family tree |
| **Governance** | Cooperation – could be social events |
| More local people making decisions | Positive interaction |
| Right to bear arms | Faith in god – Strong churches and faith |
| Strong military | Love |
| Communication among local and federal government | Be content with what you have |
| Relocation | Patience |
| | Unselfishness |
| **Outdoor activities** | Love for children |
| Places to play | Respect for nature |
| Outdoor games | Respect for others |
| Beautiful land | Peace |
| Beaches | Hard work |
| Sports – basketball/volleyball | Success |
| Eskimo games | Traditions |
| Eskimo dancing | |
| Water parks | **Food** |
| | Growing food – farms |
| **Technology** | Caribou |
| Hovercraft | Subsistence activities-hunt/fish/gather |
| Time travel | Lower prices for healthy foods |
| Virtual reality | Fishing |
| Easy Transportation | |
| Snow machines & activities | **Economic activity** |
| Artificial intelligence | Companies – jobs at home |
| | Good paying jobs |
| **Health care** | Markets for goods |
| Good health care | Lower prices for goods |
| Doctors in community | More resources |
| No drugs and alcohol | Shops and restaurants |
| No domestic violence | |
| | **Environment** |
| **Relationships** | Clean water |
| Family | Clean environment |
| Friendships | Colder winters – 'normal weather' |
| Communication – face to face | Sea Ice |
| | |
| **Education** | **Arts** |
| New schools | Art |
| More scholarships | Writing novels careers – reading |
| Vocational education – welding | Music |
| Adaptation | Museums |

The NASP Key Factors List is nearly twice as expansive due to the fact that this workshop occurred over three 2.5-day workshops over the course of a year while the Arctic Futures Makers scenarios development workshop was only two days in total. In each case the lists are ranked in order of importance combined with uncertainty scores.

Students' list of key factors demonstrated a closer connection to the land, activities, and people in some ways that the adult list did not. The students thought broadly and widely while adults were more specific in naming the factors, with a special focus on policy relevance. The relations between the two lists are remarkable in their similarities across generations. The only outliers were the identification of housing and collaboration as key factors by the adults, and the students' emphasis that the arts maintain status as a key factor. One might identify 'right to bear arms' as an outlier but when the young men were asked to unpack the importance and what 'the right to bear arms' meant, much was made about subsistence access, security, and self-governance. One should not underestimate the vital importance of firearms as a tool for subsistence when store-bought food is so expensive. These right-to-bear-arms aspects fit into many of the key factor categories on the adult list, but the adults' items have different nuances, such as 'control over land management' or 'the economics of subsistence'.

Eight of the 12 student key factors are directly reflected in the adult key factor list. The four outliers could easily be hypothesized by the stations in life each group inhabits. The students likely have more discretionary time to consider and practice in The Arts and Outdoor Recreation in Nature. The younger group also mentioned specifically Good Jobs as they are approaching that crossing in their lives, whereas many of the adult stakeholders were employed and/or combining with subsistence practices that supported their livelihoods.

The results indicate the students and adults who participated in these workshops share similar ideas in terms of the key drivers of future resilience. The similarities in data between Arctic decision makers (NAB and NSB in the NASP project) and Arctic youth are striking and make a strong argument for the value-added potential of youth engaging in the conversation. The youth offered a breadth and intimacy with the issues that their adult counterparts seemed a step removed from. The youth are still at work and play, often on the land. This playfulness and lack of defined roles emboldened students to truly imagine and offer up horizon scanning, key factors and possible paths that were not reflected in the adult group's output.

**Table 5.** Key factors ranked by importance and uncertainty.

| Key factors – importance | Key factors – uncertainty |
|---|---|
| Alternative Energy | Energy – woodstove/stove oil |
| Right to Bear Arms | Economic activity – more resources |
| Local Decision-Making/Government to Government Communication | Alternative energy |
| Beautiful Land/Clean Environment | Growing food and farms |
| Outdoor Activities (including snow machines) | Iñupiaq Values – Be content with what you have |
| Good Accessible Healthcare | Writing novels & reading careers |
| Iñupiaq Values | |
| Scholarships/Access to Education | |
| Subsistence | |
| Good jobs | |
| Sea Ice | |
| The Arts | |

**Table 6.** Key factors of AFM vs. adults (NASP) bolded key factors are common.

| NAB students' key factors | NAB/NSB adults' key factors |
|---|---|
| 1. **Alternative Energy** | 1. **Iñupiaq Values** |
| 2. Right to Bear Arms | 2. Land Management/Ownership |
| 3. Local Decision-Making/ **Government to Government Communication** | 3. **Subsistence Security** |
| 4. Beautiful Land/ Clean Environment | 4. **Sustainable Energy** |
| 5. Outdoor Activities (incl. snow machines) | 5. Regulatory Process Participation |
| 6. **Good, Accessible Health Care** | 6. **Interaction of Levels of Governments** |
| 7. **Iñupiaq Values** | 7. Substance abuse and related crime |
| 8. **Scholarships/ Access to Education** | 8. Intersectional Community Engagement |
| 9. **Subsistence** | 9. Preparation of teachers and school administrators |
| 10. Good jobs | 10. **Climate change at the global and regional scale** |
| 11. **Sea Ice** | 11. **Access to quality healthcare** |
| 12. The Arts | 12. Transmission and recognition of Indigenous knowledge |
| | 13. Demographics |
| | 14. Cost of Living |
| | 15. Pan-Arctic Collaboration |
| | 16. Tribal Governance |
| | 17. Access to and affordability of housing |
| | 18. Local Determination (of Policies) |
| | 19. (Indigenous) Language Proficiency |
| | 20. **Local Access to Education for College, Career, and Livelihood Readiness** |
| | 21. Access to Markets |

## *Day 2 of AFM scenarios workshop – creating scenarios*

After reflecting on the previous day's accomplishments, we set off to envision the future by discussing how the Key Factors might interact with each other over time. The main Day Two objective was to have students craft four narratives related to possible trends in the Key Factors. We used a standard two axis, four quadrant scenario method to focus them on how we might get to the future from the present and what four different futures – different combinations of plausible future projections of the Key Factors – would look like and mean to them. They worked in four groups of five each, then presented these narratives back to their colleagues in plenary.

Next, a facilitator explained scenario narrative writing and our methodology. To reengage their energy, rather than push them more on the most uncertain factors (noted above), we organized around two axes drawing on topics they had indicated were important, but also ones about which they seemed to have enough knowledge to explore deeply. One axis was 'environmental stewardship' exploring the extent of care for the environment related to presence or absence of enforceable rules around shared values. The second axis was 'cost of fossil fuels' representing the world market costs of oil, gas, and coal across a high to low spectrum. We physically explored the future together using the room divided into four quadrants as a four futures analogy. Each table was a different future. These two drivers incorporated impacts of many of the key factors that came to light in the students' vote from the previous day. Also, these two conceptual axes are used by many scenarios in literature on the Arctic and its future (Lovecraft et al., 2018)

Students in each group grappled with the question, what does the year 2040 look like in our quadrant? Then we refined the results as a whole group, bringing in two of the other key factors into each of the quadrants or futures or narratives. It was important that the students brought the key factors back into light in the 2040 version of their community. Students then took the list of key factors, cut them up, pasted them on poster paper and considered what

these two drivers' impacts would be on each of them by 2040. Next the facilitator had students develop a character for the students' scenario narratives, either fictional or based in fact. This gave students the chance to bring the scenario writing activity down to a more personal level and to engage creatively and imaginatively. It also provided more data on the students' interpretations of what kind of skill set one would need to thrive in a 2040 determined by the intersections of environmental stewardship and cost of fossil fuels. Utilizing a strategy called jigsaw, one traveler from each group travelled to each of the other groups to see how the future played out for them. Then the traveler brought back the news of the other futures.

After lunch, it was time to begin developing the scenario narratives. We began with an activity called backcasting. Each group started in 2040 and imagined how they might have arrived in this future via the drivers and using the future they had imagined for 2040 under the guidance of the two drivers. Then we asked them to go back to the present and assess the current situation based on their preexisting knowledge and what we had talked about in the previous day's session in terms of current events and trends. Now that they had some ideas of what 2040 might look like under these conditions of fossil fuel costs and environmental stewardship, they summarized those details and entered them in the space for the 2040 on the timeline. They then worked backwards to the present, adding events that led to successive events. We used the timeline as one of many different props to inspire a story. We each started at a table to get groups writing, brainstorming and narrating a path toward the futures of 2040, beginning in 2016. After lunch, we began planning out the final presentations: each group presented a visual, a narrative, and a verbal exploration of the future via the drivers they were asked to explore (Figure 2).

## Discussion of Arctic futures Makers survey data

In order to gain anonymous feedback from students about resilience, education, and their communities, we administered pre- and post-surveys. The two surveys differed slightly from each other: some general questions, such as demographics queries, were only asked once, while other questions were repeated on both surveys to capture the effects of the workshop. While we asked a range of questions related to community and personal resilience for the purposes of evaluating the students' knowledge and the effects of the workshop, here we share the questions related to Hypothesis 3. Did the workshop provide them with a valuable experience in their minds? Did the deliberative nature of thinking about the future through a scenarios methodology actually address what they, as high school students, felt was important for the future of their region?

### *Survey results*

Several questions related to the workshop experience were only asked in the post- survey. These two sets of questions were tied to the framework from Andersen and Hansen (2007), informed by decades of deliberative democracy literature (Ryfe, 2005). We surveyed participants on four dimensions: political tolerance, mutual understanding of opinions, quality of deliberation, and political efficacy. Because this was a pilot project it mattered to us that students felt the workshop process was fair and fun, but also provoked deliberation over issues related to leadership such as tolerance of different ideas and feelings of self-empowerment in public fora. We asked students to respond to these types of questions based upon on a five-number Likert scale (where 1 was strongly disagree and 5 was strongly

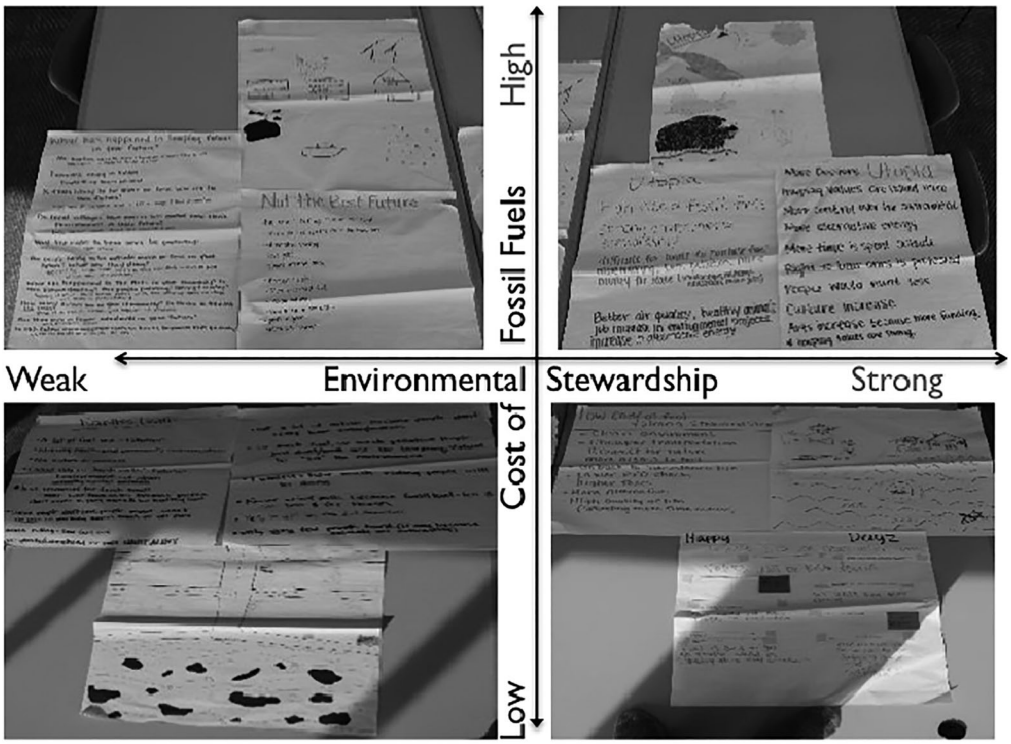


**Figure 2.** Scenarios workshop products– (1) story outline and (2) diagram photographed in respective quadrants along two axes. Along the horizontal axis, weak to strong environmental stewardship and along the vertical axis, low to high costs of fossil fuels. One group of five students (4 total) generated the products in each of the four quadrants.

**Table 7.** Likert scale.

| | |
|---|---|
| 1 | Strongly Disagree |
| 2 | Disagree |
| 3 | Neutral |
| 4 | Agree |
| 5 | Strongly Agree |

agree). We utilized the median to determine the general tendency in responses, and only used averages to rank the responses in relation to one another (Bishop & Herron, 2015; Jamieson, 2004) (Table 7).

### *Consensus*

Overall students agreed (median 4, average 4.1) that from the beginning 'there was consensus in our workshop about the meaning of healthy sustainable communities'. We took this as a strong signal that as facilitators we had prepared well to meet the needs and interests of the students in relation to the subject. Students also agreed (4, 4.26) that 'towards the end there was consensus in our workshop about the meaning of healthy sustainable communities'. This would seem to indicate that the participants, after considering a wide range of subjects agreed

on the nature of resilient communities. While this is a positive outcome in one way, the fact that students also agreed (4, 3.89) 'that there was often consensus on the subjects discussed in small working groups' made us question whether we have provoked them enough with different perspectives and data to have meaningful discussions. We felt somewhat relieved to see that they were neutral on average (3, 3) when asked whether 'it was difficult to *agree* on any of the subjects discussed in small working groups'. Scores on this question ranged widely from 1 to 5 with multiple respondents at the ends of the range of responses. For us this indicates that the participants felt they had to deliberate, to engage one another. Their disagreement on the question response itself indicates there was not just a 'group think' at work. We certainly we witnessed a variety of lively debates and students taking one another seriously when discussing concerns over the future.

### *Discussions*

Students agreed (median 4, average 3.53) 'that a few participants dominated the discussions'. This result disappointed us, in part because we worked diligently to encourage participation from all the students and from our perspective as facilitators we felt a majority of the participants did in fact engage in the discussions. Students agreed (4, 3.53) that alliances arose between some of the participants. This result is interesting because while about half of the students were from Kotzebue in fact most of the participants did not know one another. We interpret this indicator in a positive manner that students felt comfortable enough to work together when they agreed on perspectives and information. Students were neutral but slight in agreement (3, 3.42) that 'the discussions in the small working groups were superficial'. This result assigns us as facilitators a stronger burden to ensure depth as we engage our young participants, perhaps to challenge them more and with information and policy debates. Students disagreed (2, 2.74) that there 'was too little time to discuss' important issues. Students generally agreed (4, 4) that 'all aspects of healthy sustainable communities were covered in the small groups or during the workshop'. Similar to the other question related to consensus the fact that this is positive but not higher than 4.0 indicates participants' feeling of completion rather than a sense that they already had comprehensive knowledge about resilient communities about which they all simply agreed.

### *Mutual understanding of opinions*

Students generally agreed (median 4, average 3.84) that 'the discussions were characterized by responsiveness towards each other's arguments'. Students also agreed (4, 3.79) that each of them individually developed 'an understanding of positions that were opposite their own'. Students agreed (4, 4) that 'all positions in the group were considered with equal respect' and they agreed (4, 3.74) that 'the arguments of the other participants were useful' in forming their own position. This battery of responses reduced our concern that students didn't feel listened to in their groups or in plenary given the earlier response that some students felt conversations were dominated. In context these responses about mutual understanding lead us to interpret what we witnessed over the two days was clear some strong personalities who drove conversations, but in an environment where students felt respected and able to be heard, as well as listen.

### *Political tolerance*

While the students didn't engage in lengthy political debates, their subject matter related to social and environmental change was challenging in terms of what we expected them to know and discuss in relation to policies in the region. The participants agreed (average 4, median 3.68) that 'lack of knowledge is the reason why other people have plans or visions of the future of the region that are different' from their own. And they agreed (4, 4) that 'other citizens have good arguments for supporting plans or visions of the future of the region different from their own'. These responses indicate a strong sense of individual tolerance on the part of the participants for differences in opinion as well as the concept that learning, exploring new knowledge, is a valid way to form, and change, plans or visions in the region. For young potential leaders this is a positive outcome.

### *Political efficacy*

Lastly, we were curious, even if they felt empowered in the workshop, if our participants generally thought their voices, youth opinions and ideas, were valuable in other fora. We asked them to evaluate their input into the political, policy and decision-making processes in various scales of government. Overall students were neutral and trended toward disagreeing with statements that diminished their role as citizens. When evaluating the statement 'citizens like myself have no say in decisions made by state and national government' students' results indicate a firm sense of political efficacy (average 3, median 2.89) Students were neutral again trending to disagreement (3, 2.84) when thinking about the statement, 'citizens like myself have no say in decisions made by the borough'. Reponses were positive and trending towards agreement (3, 3.37) when considering whether 'citizens like themselves are qualified to participate in the debates over U.S. Arctic Policy'. However, in general, students agreed (4, 4) that 'citizens like themselves have viewpoints that are worth taking into consideration'. While we cannot separate whether our workshop promoted feelings of political efficacy or these young people came into the workshop with a strong sense of their ability to be heard by government and make a difference in policy, the workshop did provide the social learning space for them to engage in deliberation over subjects vital to the future of the policies of the region.

## Discussion

The high school students proved to be less imaginative than expected. Youth and their wild imaginations were what we hypothesized entering the AFM project. While students certainly showed innovation in their thinking about futures, they were logical and rational when allowing their imagination entertain futures, even a bit hesitant at times to speculate 'outside the box'. They needed considerable time to explore the idea of being able to imagine different futures, unlike the adults who quickly understood they were being asked to imagine. This may be due to over a decade of standardized education and imposition of a system of schooling that can be at odds with local cultural traditions. While beyond the scope of this study and difficult to measure, we hope to evaluate in the future how this singular standardized approach to education, that often lacks relevancy, may limit students' capacities to critically think, imagine, and step outside the norms in a system. Particularly in locations of rapid environmental and social change flexibility in practices and institutions will be needed to adapt successfully.

The resilience strategies and their practices that these students already possess are informative and tell a story of their own as to potential adaptation strategy pathways. Nonetheless,

it is incumbent on the adults, as educators, facilitators, and decision-makers to thoughtfully consider, how we can facilitate students' capacities to envision and project future adaptation in order to promote resilience in the systems these students will engage as they age. In the students' institutional scholastic development, it might be considered in the scope of how literacy skills are developed. But, in the case of preparing them for the future, we need to have different metrics that consider their location and socio-cultural context. We had expected that these activities in exploring resilience would be new to the students. However, after got to know one another and began working well together these students were observant, had solid listening skills, and were open discussing, and debating, their thoughts and feelings about possible futures. They clearly could demonstrate knowledge of their communities and had a sense of the nature of the Arctic as perceived by others. The terminology may have been new to them in some ways, but we would argue that these students came armed with their own strategies for resilience in their communities amongst a global backdrop of uncertainty for their local social-ecological systems and culture.

The students' key factors were remarkably similar to those of the adults. There was correlation between the lists of the adult opinion leaders from the NASP research and the AFM project students' key factors. Students' key factors demonstrated a more fine-grained connection to those factors, an optimism, a solution-oriented approach in contrast with the adults' business-like terminology, reality of context, and more problem-oriented summation in considering what would most impact healthy sustainable communities of their region. It could also be accounted for by the strong respect often indicated for the opinions of Indigenous Elders in the region.

Most importantly for our intentions to provide social learning in novel forms in Arctic high schools, the positive responses to the questions on political efficacy about 'citizens like myself' are heartening. Given the similarity of their ethnicity, tribal affiliation, and regional ties this suite of responses provides powerful positive evidence that 'citizens like myself' – high school age, Inupiat, rural, practitioners of subsistence and other cultural touchstones such as language, dance, or artwork – matter to the future of policy-making. In many cases this group would be considered a marginalized population in the larger context of the state of Alaska and U.S. school system and yet their positive responses to participation in a workshop led by three non-Indigenous Alaskans coming up from the University in Fairbanks demonstrates strong individual and group resilience.

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