The Modern Blanket Toss: Expanding Horizons in Alaska

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Scientia

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The Modern Blanket Toss program offers students attending high school in Alaska, the chance to engage in a series of learning activities using drones – focusing on the wellbeing of local communities. **Dr John Monahan** of the University of Alaska Fairbanks describes efforts to engage underserved students in the STEM curriculum, leadership activities, and community building so they can pursue post-secondary studies and careers in science.

Introducing STEM Fields to Young Generations

New technological tools such as artificial intelligence, 3-D printers and unmanned aerial vehicles (UAS), also called drones, are gradually affecting societies worldwide. As technology becomes increasingly complex, finding engaging ways of introducing science, technology, engineering, and mathematics (STEM) to younger generations is of key importance to providing the presence of a technically skilled workforce in years to come.

This is particularly and practically true for groups that tend to be underrepresented in STEM fields, such as women and ethnic minorities. Numerous programs worldwide are trying to increase underrepresented students' interest in science, with the hope that this will bring greater diversity within fields that might seem intimidating or hard to approach.

The aim of these programs is to introduce particular fields of science in engaging ways to young people who might otherwise never be exposed to them with the hope that this will stimulate their desire to expand their knowledge of STEM-related subjects. The Experimental Program to Stimulate Competitive Research (EPSCoR) is one of the social institutions trying to strengthen STEM-related skills at national and global levels, broadening the participation of different cultural groups in scientific activities.

Establishing partnerships with governments, schools, higher education providers, and industry experts, EPSCoR develops programs aimed at shaping the workforce of the future, educating younger generations to the value of scientific subjects.

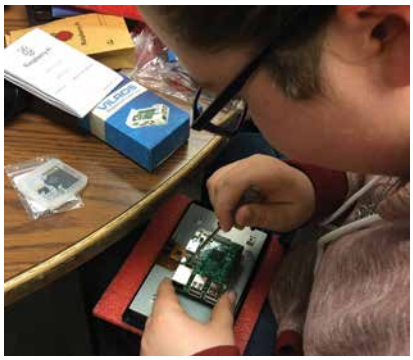
Like EPSCoR the Modern Blanket Toss project seeks to shed a STEM light in places where research shows it shines the least – among underserved populations in remote communities. Not by removing the students from their communities, but by providing STEM and leadership tools they can apply in their own backyards.

Increasing STEM Interest in Alaskan Students

High school students in rural Alaska face numerous challenges on their path to college and in their pursuit of STEM careers. Many of these students are Alaska natives, an underrepresented minority, living in impoverished communities that are often hard to access by road.

As most of their family members never attended college and come from low-income backgrounds, they tend to be less aware or motivated to pursue higher education. Local Alaskan high schools also sometimes lack advanced equipment and resources, making it harder for these students to get the chance to experiment with relevant technology.

All these factors combine to make it difficult for many students living in rural areas in Alaska to pursue further education, ultimately limiting their possibilities in STEM-related careers. The Upward Bound program hopes to change this and has already run several initiatives aimed at increasing the rates of college applications from low-income



students, which included tutoring sessions, summer projects, and other assistance during the academic year.

The program recruits these students to learn new habits for study and scientific thinking, which makes it possible for students to understand and function in the academic worlds of post-secondary education. Otherwise the gap from the village to the university would be too wide for many of these students to cross.

So far, it has already achieved considerable results. Since 2000, 41% of the underprivileged students who took part in the initiatives organised by the program pursued further education, more than five times the proportion observed in other students who did not participate.

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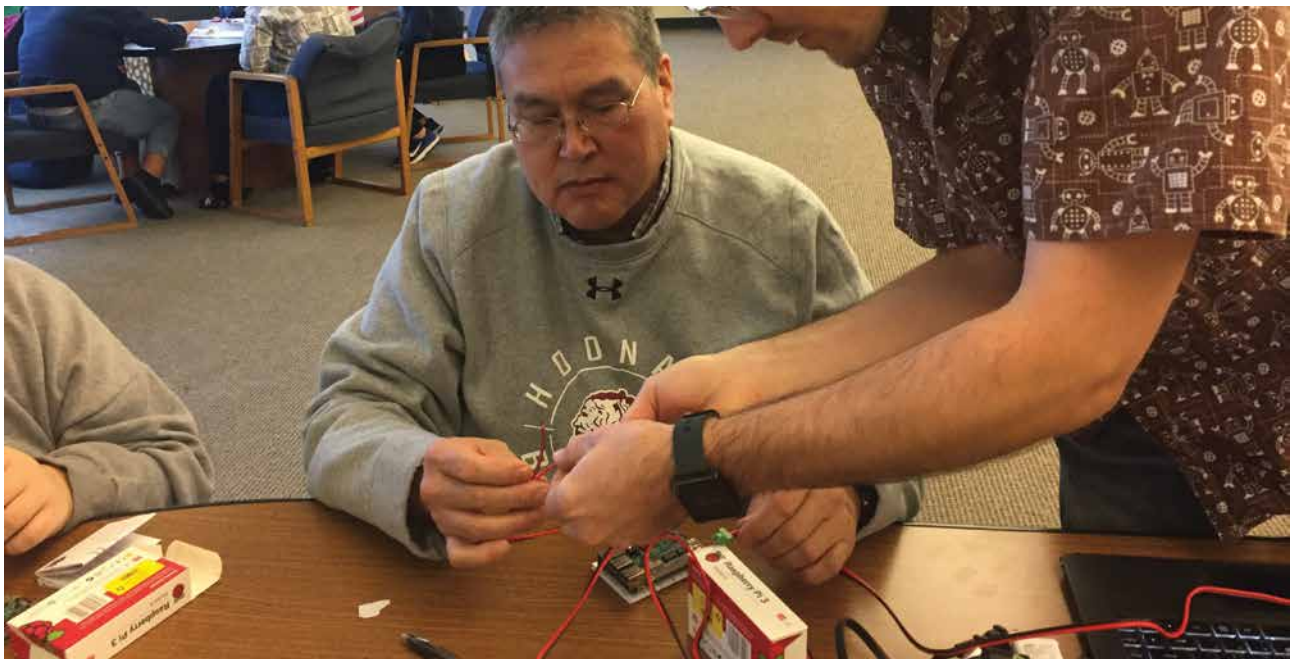

The Modern Blanket Toss

The Modern Blanket Toss is a project devised by EPSCoR in collaboration with the Upward Bound program at the University of Alaska Fairbanks (UAF), with the mission of helping students living in rural areas of Alaska to develop an interest and skills in STEM fields, while also benefitting local communities.

The five schools participating are situated in the communities of Shishmaref, Bethel, Chefornak, Nikiski, and Seward. Dr John Monahan, Director of the Upward Bound program and Principal Investigator of the project, said, ‘we named this project after the Alaskan Native tradition of the Blanket Toss, which enabled people to expand their horizons beyond their immediate surroundings. We want this project to do the same thing – literally, by giving students a bird’s eye view of their communities, and figuratively, by exciting them about college and STEM careers.’ The project ‘lifts’ students’ awareness of their local surroundings through science and community projects through leadership development.

During the program, the students participate in learning activities using Unmanned Aerial Vehicles, commonly known as drones, and Geographic Information Systems (GIS) technologies. Rural Alaska is an ideal location for this project, because of its educational challenges, as well as its substantial level of expertise in the field of drone technology.

Being a large state affected by harsh weather conditions, where 82% of local centres are not served by roads, Alaskan communities can truly benefit from drones and advanced GPS technology, that could be used to map territories that are hard to access, or to monitor community environmental conditions that might threaten safety or quality of life.

This is particularly true for the areas where the program takes place, that are surrounded by wilderness and are difficult to explore. In the summer, all students who take part in the program receive immersive training at the UAF campus, on using drones and attend leadership classes about pursuing careers in science and research. The course includes teaching the students about drones, geospatial cognition, GIS, and other associated scientific concepts, as well as leadership and hands-on experiences using the technologies available at UAF.

Subsequently, students return to their communities, attending course-related learning activities in school and performing experiments with drones and GIS devices, that include mapping, simulated search-and-rescues, aerial photography, weather studies, and other exercises designed to increase STEM awareness and skills.

In addition to their normal lessons at their local school, the program coordinators teach the students about drones and GIS technology, as well as basic maths and science, either in person or through video conferences.

Applying their Skills to Community Projects

The Modern Blanket Toss program incorporates very strong hands-on components. Throughout the course the students take part in various practical activities using drones and GPS software. Towards the end of the year, every school is assigned a mapping project designed to benefit local Alaskan communities as part of the leadership training for students. Students learn to listen and research the needs of their own communities through elders and community organisations. They become ‘part of the solution’ through this program that teaches active citizenship.

‘In the Modern Blanket Toss students first learned the skills needed to fly an unmanned aerial system and process data, before approaching the unique projects that each community felt was important and possible to address with such a system,’ describes

Dr Monahan. When completing these leadership community projects, students are asked to apply the knowledge they acquired to a broad variety of tasks, ranging from examining landfill locations, to mapping and recording street names, or tracking changes in local sea ice.

'Each project was unique to the community involved and each used the skills taught,' says Dr Monahan. 'In Bethel, students worked to map open holes on the river ice. In Seward, students worked to map areas that were inundated by seasonal floods. In Shishmaref, students mapped the erosion of the beaches. Each project is different, but all students followed a process to understand community issues and utilise the technology integral to addressing the problem.'

All the projects provide students with the chance to learn and lead in their own community building confidence and resiliency among students that prepares them for college. The students are encouraged to share their results with each other and with their coordinators, to exercise their communication and leadership skills, while experiencing what it means to feel part of a larger learning community.

Once the mapping projects are complete, they are asked to present their results at community meetings and events, including a workshop in the final summer of the program, where results are showcased for an audience of nationwide educators. Students are seen and see themselves as young leaders who help their neighbours and families through STEM skills.

The Project's Accomplishments

So far, the Modern Blanket Toss project has achieved remarkable results, with local coordinators feeling they acquired considerable knowledge about drones and GIS software, potentially improving their STEM instruction and providing extensive help for future community projects. Overall, students who participated were also very satisfied with the program and were excited to learn about drones and GPS technologies.

They showed appreciation for the practical aspect of the course, both in terms of the experience with flying drones and with the mapping applications. Students also felt that they had made important connections with peers, teachers and coordinators, that boosted their enthusiasm and positive attitude about scientific collaborations.

Most students who participated in the program felt it improved their communication skills, their knowledge of the STEM content areas and their understanding of scientific practices. The program, however, did not always run smoothly, and program leaders found they had to deal with unique challenges, such as the harsh Alaskan weather, the speed at which the technology used became out-dated, and the inaccessibility via internet and communication of the rural areas in which some of the schools were situated.

However, the positive feedback received from those who took part encouraged the program leaders to expand and improve the project over time. And the students grew more resilient in their growth mindsets willing to persevere and learn from mistakes.

The T3 Project – a Brand New Program for Alaskan Youths

The Upward Bound program at UAF is now collaborating with EPSCoR on a new project founded by the US National Science Foundation, that is also aimed at promoting STEM-skills among young generations in rural areas of Alaska.

The new education quest, called the 'Teaching through Technologies' (T3) Alliance' program, will recruit instructors and students from several remote communities in Alaska and support them, both online and in person, in adopting new curricula including scientific training and practical use of emerging technologies. The program will particularly focus on UAS, 3-D printers and small computer like code-able digital devices called Raspberry Pis.

Students who take part will also receive training in STEM communication and leadership, applying their newly acquired skills to solve issues relevant to the local community.

'The 36 sites in the T3 Alliance program across the 'lower 48' have a wide variety of geographic, environmental and cultural conditions that make it difficult to use a "one size fits all" model for community projects,' said Dr Monahan. 'Early on in the program we will teach the process of leadership and design thinking to identify and prototype solutions that meet the unique needs of their community.' The curriculum will also include the key component of teaching growth mindset to embed resiliency in the face of setbacks and embracing mistakes as new learning opportunities.

Practical activities could include building a sensor game using Scratch and Python coding language in the Raspberry Pi, or designing and printing 3D objects integrating Raspberry Pi sensor components. Similar to the Modern Blanket Toss program, this new project was designed to help young underrepresented youth gain greater knowledge of new technologies, while also encouraging them to apply their scientific skills in real-life scenarios that are meaningful to their community.

The projects developed as part of the Upward Bound program of UAF are a perfect example of how the right academic initiatives could open greater possibilities for young people who are part of underrepresented minorities, encouraging them to pursue further education in STEM-related subjects and hence promoting a more diverse skilled workforce for the future.

The leadership and community building aspects of the project further prepares students for leadership roles in STEM careers to apply new tools to the benefit of the organisation and the community as a whole.

Meet the researcher

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Dr John Monahan is the current director of Upward Bound courses at the University of Alaska. After completing a BA in Business at Rockhurst College in Kansas and an MS in Cultural Education at Kansas State University, Dr Monahan began his extensive career in education. He has worked within a broad range of academic settings, teaching Education Leadership at the University of Alaska Anchorage, previously covering other roles such as Superintendent at Fairbanks North Star Borough, as well as principal and teacher at a number of schools in Alaska and Kansas. Dr Monahan's career has primarily focused on the administration of academic institutions and on promoting the introduction of technology-assisted instruction. Prior to his return to the University of Alaska, he also worked for three years with Apple, coordinating the Alaska One-to-One project, which was aimed at administering computers and technological tools to students and teachers at universities. Over the past decade, he has covered different roles at Alaska University and has travelled around the country, working closely with students, teachers, and administrators. Dr Monahan has recently been working on a project called the 'Modern Blanket Toss', using drones to introduce technology to First Nation students, while broadening their understanding of the local community.

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