STEM EDUCATION BLOG

Introduction by Lorraine Chaffer

SheMaps is one of Australia's leading providers of training and resources for Geospatial Education. They provide online and in-school drone and geospatial science programs and training for students and teachers with a strong mission to increase the engagement of girls with STEM subjects, skills and careers.

SheMaps recognises the place of Geography in STEM and is passionate about assisting teachers to see the place of Geography in projects and tasks labelled as STEM. Several blog entries relate to the recognition of Geography in STEM and the practical use of drones and GIS in real world situations and careers.

"At SheMaps, we're also passionate about the value of real-world applications to enhance student experience! This is why all of our activities are centred around real-world challenges for students to find creative and interdisciplinary solutions for. Have you seen our newest challenge, 'Healthcare in the Himalayas – Drones to the Rescue'? In this activity, students use design thinking and both manual and coded drone flight to address a humanitarian challenge in Nepal".

Source: https://shemaps.com/blog/what-can-students-learn-from-drones/?r_done=1

The Blog provides updates about SheMaps school programs such as the Healthcare in the Himalayas Program as well as insights into the world of spatial technologies, including links to careers.

Reading SheMaps blogs can be used to satisfy NESA Elective Professional Development requirements.

Two examples of blog posts with a clear link to Geography are included here.

- Helping students succeed through GIS
  (A great read for teacher professional learning)
- The role of surveying in restoring native title
  (A great resource for use with students)

Did you catch Brett Dascombe's talk at EduDrone this year? He shared some of the fantastic work he's doing integrating GIS and spatial technology into his Geography classroom. Each month in the lead up to EduDrone 2021, we'll be releasing one of our favourite talks from EduDrone 2020! Tune in each month to get your fix of STEM-spiration. We hope this will keep the ideas flowing all the way through until EduDrone 2021!

What is GIS? What can it do?

The 18th of November is International GIS Day – where we celebrate Geographic Information System (GIS) technology! For those of you who aren't familiar with GIS, it's a tool for gathering, managing, and analysing data that's rooted in the science of geography, and the output is often in the form of maps! Hundreds of thousands of organisations in virtually every field are using GIS to make maps that communicate, perform analysis, share information, and solve complex problems around the world. This is changing the way the world works.

Brett Dascombe is a Geography teacher at Wavell State High School. He's been working with ArcGIS (a major software for GIS) since 2001, where he used Version 2.3 (for reference we're now up to Version 10.8!). He even spent two years working for the software company behind ArcGIS, called Esri (the Environmental Systems Research Institute). During EduDrone he shared some of the impressive work his students were doing using GIS, and plenty of inspiring project ideas!

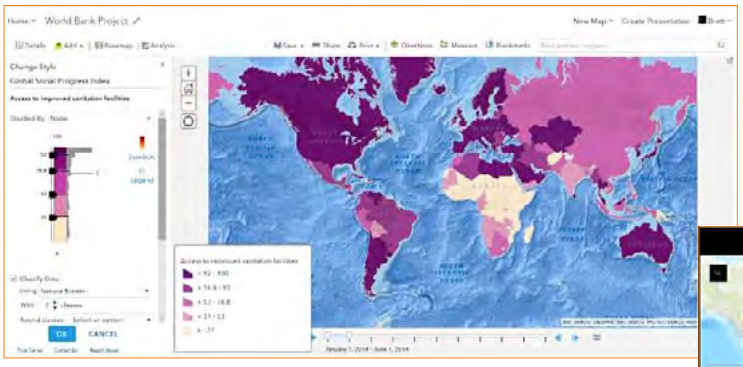
Using Storymaps in Esri

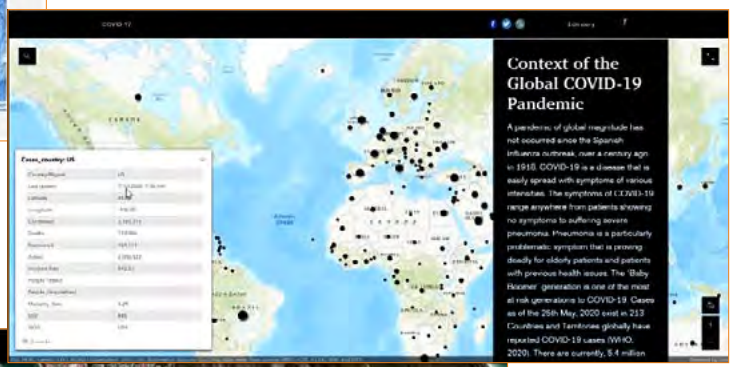
One of the coolest new tools that Esri have released are ArcGIS Storymaps! If you've never heard of these before, check out this video demonstrating a Storymap of a **National Geographic expedition to Mt Everest**. https://www.youtube.com/watch?v=8wY14zHDmEs

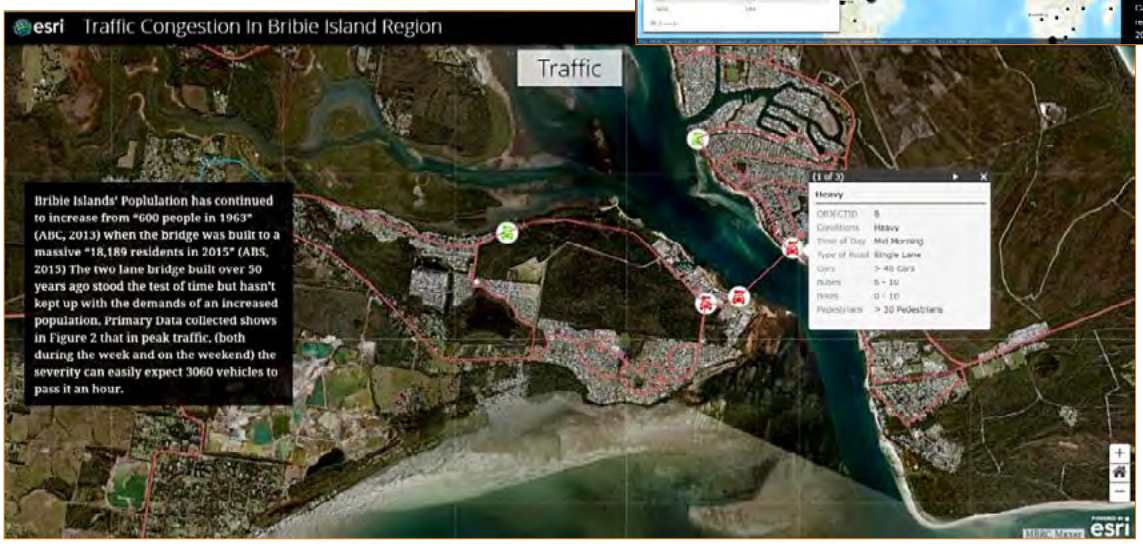
Brett's students have been using Storymaps to present their assignments with some fantastic results! Take a look at these examples done by Brett's Grade 10 students that use Storymaps to explore a local traffic congestion issue, as well as global scale dynamics of the COVID-19 pandemic.

Here are some other great project ideas which Brett has used for learning with spatial technology:

- **Human wellbeing** e.g., sanitation, food security, disease outbreaks.
- **Environmental change and management** (can possibly be incorporated with a field trip!) e.g., microplastics, erosion, bushfires, weed invasion.
- **Urban Planning** (another field trip opportunity!)
- **Global population change** e.g., birth rates and megacities







Thinking Outside the Box to Benefit Students

I think you'll agree that the work that Brett's students have produced is truly impressive for any age level, let alone Grade 10! During his EduDrone 2020 presentation, Brett shared some of the inventive ways that he's been able to encourage students to consistently improve and succeed.

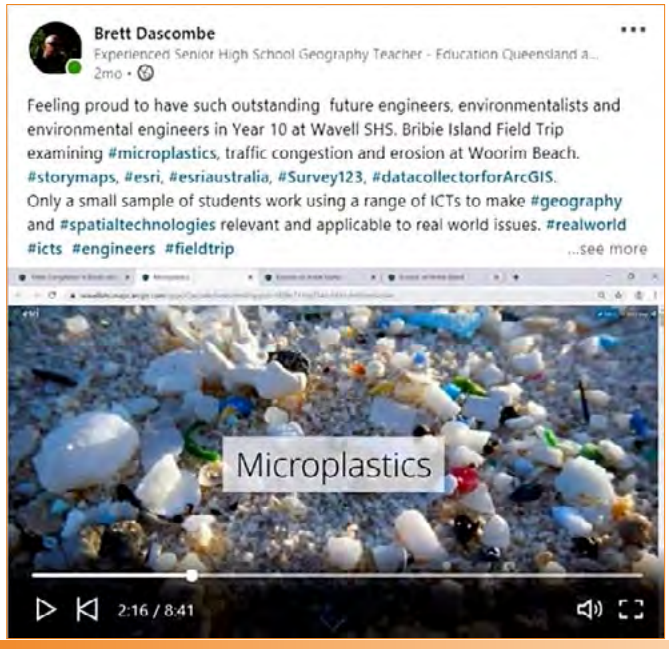
- **Entering in competitions**

  Anything involving a cash prize is pretty sure to get students attention! Brett has encouraged his students to enter their work into both national and international competitions. Winning isn't important, but it gives the students something to strive for other than just an assignment grade. Here are some of the competitions Brett is using to motivate his students:

  - Asia-Pacific Spatial Excellence Awards
  - Australian Planning Excellence Awards
  - ArcGIS Storymaps Competition for Sustainable Development Goals
  - SheMaps: Map My School Competition
  - ESRI User Conference, San Diego, California – Map Gallery

- **Promoting Students in Professional Networks**

  Not all teachers out there are using social media, but if you are, share your students work! Brett has been posting snippets of his student's Geospatial assignments on his LinkedIn account, where it is seen by teachers, university professors, and industry professionals. One of his posts about an erosion project on Bribie Island received 1900 views – from people all over the world from Canberra to Dallas, Texas.



Transitioning to Online Learning

2020 has seen many teachers and students transition to online learning. This has been challenging for many. Brett found a unique way to support his students during the COVID lockdown, by creating a YouTube channel to help assist students with the transition to online learning.

Spatial Tech is Good for Students

Just like at SheMaps, Brett is passionate about the power of spatial tech and geography to make positive changes in the world! He is always seeking to improve his own GIS skills and to come up with new and inventive project ideas for his students. With hundreds of thousands of organisations across every field you could think of using GIS, it truly is a tool for the future!

If you're looking for project ideas or further inspiration for your Geography or STEM classroom, there are often local social media networks you can join. You can also reach out to us at She Maps! **Let's get geospatial in the hands of the next generation!**
https://shemaps.com/blog/helping-students-succeed-through-gis/?r_done=1

Brett Dascombe will share his classroom use of GIS, social media and industry links at the 2021 GTA NSW & ACT Annual Conference.

Many of us see surveyors working with their tripods by the roadside but have a limited understanding of what it is they do or just how different and exciting their jobs can be. We're on a mission to showcase surveying! We're teaming up with a number of young surveyors across the world to bring you their favourite projects and what they love the most about working as a surveyor.

So what is Surveying?

Surveying is the measurement and mapping of our surroundings using mathematics, specialised technology and equipment. Surveyors measure just about anything, from buildings and structures, to the land, the sky or the ocean bed. They even measure polar ice-caps!

What are the fundamental skills of surveyors?

Whilst surveyors use maths skills and technology to do their jobs, there is also a strong link to Geography. Surveyors use geographical inquiry skills on a daily basis to observe, question, and plan how to solve problems. They collect, record, and represent information and data from a variety of sources. Once they have this information, then they make interpretations and conclusions, then communicate these results and findings to a wide variety of audiences.

This series showcasing surveyors, is designed to show students and teachers how the curriculum content can be bought alive in real-world examples.

Meet a Surveyor: Marie Janina Navarro Ferrer

Janina is a Geodetic Surveyor who works for the Department of Resources within the Queensland Government. She has a Bachelor of Science in Geodetic Engineering and her favourite subjects in high school were Maths, English, and Programming. Her favourite project that she has worked on as a surveyor was assessing land parcels on Mulgumpin (Moreton Island) as part of a native title determination.

Janina conducting surveys on Mulgumpin.

Mulgumpin and Quandamooka Native Title

The Quandamooka People are First Nations custodians of lands and waters within parts of Moreton Bay, and have more than 20,000 years' association with their Country. The Quandamooka People include three clans of Aboriginal people: the Ngugi people of Mulgumpin (Moreton Island) and the Noonuccal and Gorenpul people of Minjerribah (North Stradbroke Island). Similar to Minjerribah, Mulgumpin boasts a rich and significant cultural history and the Quandamooka People have a strong spiritual connection to the island. Numerous cultural sites have been recorded over the island and include shell and bone scatters, large shell middens and a stone quarry.

Southern part of Mulgumpin

Native Title is the recognition that Aboriginal and Torres Strait Islander people have rights and interests to land and waters according to their traditional law and customs as set out in Australian Law. It is governed by the Native Title Act 1993. In 2019, the Federal Court recognised the Native Title claim made by the Quandamooka People, acknowledging that Moreton Bay's islands were always Quandamooka land. Here is a great resource to explain more about Native Title.

Using Surveying in Native Title Determination

As part of the negotiations for the proposed state land actions, Janina's job was to accurately reinstate and mark out the boundaries for individual land parcels on Mulgumpin which formed part of the tenure package. To do this, Janina used geodetic data, which is the data obtained from GPS or GNSS (Global Navigation Satellite Systems), as well as cadastral surveying. Cadastral surveying is the process of accurately defining property boundaries and understanding the laws of land ownership. This may include the identification of residential or rural boundaries, re-establishing boundaries that have been previously surveyed or creating new boundaries as part of the land subdivision process.

Survey site on Mulgumpin

Janina used her skills and knowledge to interpret and advise on the location of the land parcel boundaries on Mulgumpin. Given that parts of the island were largely unsurveyed, she undertook survey work on areas of land that were State-owned to ensure there was an accurate land description registered in the Titles Office. The information and measurements taken during the cadastral surveys were used to produce a survey plan. This survey plan included a reinstatement report, outlining how the reinstatement of land boundaries was carried out, what the considerations were, and what decisions were made, as well as water boundary report, as some of the land parcels were bounded by tidal and non-tidal water.

Surveying a water boundary

What does the Native Title Determination mean for Quandamooka People's?

The Federal Court made a Native Title consent determination for Mulgumpin (Moreton Island) on 27th November 2019. Their native title determination recognises the Quandamooka People's rights that include to live and be present on the determination areas, conduct traditional ceremonies, take, use, share and exchange traditional natural resources for traditional practices, conduct burial rites, teach about the physical and spiritual attributes of the area, and maintain places of importance and areas of significance.

Joint management arrangements are being progressed for Mulgumpin's National Park and Recreation Area between the Quandamooka People and the Queensland Parks and Wildlife Service, building on the successful joint management currently in place on Minjerribah (North Stradbroke Island). This will include additional Quandamooka Rangers and new opportunities for eco-tourism on Mulgumpin. The Quandamooka Native Title also recognises some small parcels of sacred land for exclusive use.

Surveying – a constant adventure!

What Janina likes most about surveying is that no one day is like another, it is a constant adventure! She says that she never stops learning, which keeps her engaged and excited in the work. During the Mulgumpin surveying project, Janina learnt a great deal about historical and cadastral surveying, Native Title, and state land actions. Surveying has been different to what she first expected in that there are so many broad and varied work opportunities. Inspired by Janina's story? Download the poster to display in your classroom.

GTA NSW & ACT Annual Conference

The NSW Surveyor General, Narelle Underwood, will present ' Surveying offers Geography students a new horizon' at the GTA NSW & ACT Annual Conference, Thursday 13 May.